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AND ONE STEP BACK

When a Rolls Royce lets you down

Despite having a nice laptop of my own (A Toshiba Kira Ultrabook), I chose to take the Microsoft Surface 4 Pro away with me for the Christmas holiday break (which for me was a nice couple of weeks in QLD and some equally high quality couch and gaming time back in Sydney). Microsoft extended the loan period for the device (which I reviewed in PC&TA 218), so despite my hypocritical urgings here and to friends and family that holidays should be tech-free, I was all set.

The Surface 4 Pro is a beautiful looking device, and is exquisitely built, but dear oh dear does this machine crash a lot. In the few days I had with the Surface 4 Pro to do the initial review it crashed a couple of times – but only when I was running Chrome, so I didn't pay any serious attention to it as I've had Chrome crash on other devices. But the longer I used it over the break; the crashes started to add up. The alarm bells really started clanging when the device would freeze up after plugging it back into AC power after having it on battery. Now, this was rare, I'd guesstimate about once in every dozen or so occurrences of plugging it back in, but when it did crash it crashed hard. The screen was still alive, and the Surface 4 Pro was aware it had crashed because it asked (and this is all it asked) that I slide down to restart the device. But that didn't work... here was a device that was locked in a state of 'do this and I will be fine again', but failed to deliver on even that simple function. Even worse, no amount of holding down the power button, or power + volume up (which is supposed to force a reboot) worked either. It would take literally ten minutes of holding and pressing and yelling before it finally rebooted.

Googling 'Surface 4 Pro freeze crash' yielded a huge number of similar stories. As usual, the official Microsoft help forums were rich with posts by MS staff,

and as usual almost none appeared to have either understood the question, or had anything actually useful to offer as a fix. It wasn't long after that when Microsoft started offering apologies, acknowledgement and a promise to fix it via updates.

Well, my test machine is up to date with updates as of today, but as of today it still crashes, yet Microsoft has said that the issue is resolved. Because it's Microsoft, with its army of developers, and because so much is at stake with this high profile product, I have no doubt it will be fixed.

But we can't continue to recommend the Surface 4 Pro in our A-List, so out it goes, replaced with the outstanding Dell XPS 13 (for the ultra portable category). For casual use, maybe the Surface Pro 4 is a sound purchase because it's so safe to assume MS will get on top of these bugs, but for anything mission critical there's no way. This is not a machine you would want to take into a boardroom presentation for fear of a crash, and one that takes 10 minutes to recover from.

It also won't detect the Type Cover when it's attached with annoying frequency, several attempts sometimes being needed. I'm sticking with the original review and its score, because it is still an exceptionally well designed device, and with Windows 10 as its platform it stacks up as a good machine with fixable flaws.

After all this, what surprises me most is that Microsoft appears to have accepted these bugs when it was released for sale. Everything about the Surface 4 Pro screams quality – but either the internal QC process is very flawed, or they knew there were issues and someone there made a very bad decision.



Ben Mansill

Editor

bmansill@nextmedia.com.au

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- Our tests are performed by experienced reviewers in our Labs in accordance with strict benchtesting procedures
- Our brand new benchmarks have been tailor-made to reflect real-world computing needs
- We put tech through its paces – seriously. From processing power to battery life, from usability to screen brightness, our tests are exhaustive
- We will always offer an honest and unbiased opinion for every review

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Our AV and security testing is regarded around the world as among the very best, and security companies recommend our testing above others. Be sure you are using the best protection for your devices

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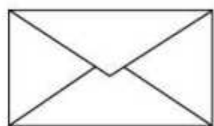
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INBOX

The PC&TA community soapbox

MACGYVER SURVEILLANCE

In your February Edition you showed how to set up a \$100 webcam as a security camera. An old tablet, Android phone or Windows Phone that's no longer used can be turned into a IP Security Camera using free apps.

There are dozen of IP camera apps in the app stores. The free apps only provide a video feed. Apps that cost a few dollars will provide extra functions such as audio, motion detection, video recording, email alerts and uploading of video to ftp servers.

For Android I use IP Webcam and for Windows Phones and Tablets I use Win IP Camera. These apps require virtually no setup and tell you the IP address to use in the remote viewing device. Port forwarding on the router and a free DDNS service has to be set up as explained in the magazine for viewing over the internet. Instead of setting up a static IP address on the IP Camera device I use address reservation on the router. (i.e. assign a static LAN IP address to the MAC address of the device that has the camera app).

Carl Francis

NEXT-GEN SSDS

Thanks for a good magazine. In the next-gen SSD article (PCTA #219) you confused me. For example on page 61, in the blue lettering on bottom right of the page the Intel SSD 750 Series 1.2TB was scored thus:

Speed	\$/GB	Bang/Buck	Overall
48/50	8/20	26/30	82%

In each of the first three categories what are the two numbers separated by a slash? For \$/GB there can only be one number, so what are the 8 and the 20 separated by a slash?

I fully appreciate how you are calculating each of the three categories, I just don't appreciate why there are two numbers? "THE SCORES" (bottom right on p59) suggests only a single number for each SSD's \$/GB.

I am very much guessing that for \$/GB you are ranking the SSD's out of 20, but you have only tested 10. So.....???? The index on page 58 suggests "How we test" is on page 37, but I think actually 59?

Ben Mansill replies: *Thanks for writing in, Colin. In hindsight we should have provided a better explanation, especially as this scoring method deviated from how we usually do things.*

The denominator (xx/xx) in three separate scores categories (Speed, \$/GB and Bang/Buck) all tally up to a highest possible total score of 100, which gives us our overall % score as well. We weighted each denominator according to importance (so speed is the most important at half the overall score (xx/50), etc).

DUAL BOOTING WINDOWS

Hello Ben, I wanted to let you know how I worked around the issues with Windows 10 upgrading that Jon Honeyball has been writing about recently.

There is a simple solution to this. Using two different Windows 7 Pro serial numbers on two drives, I upgraded one to Windows 10 and left the other one with Windows 7. Now there are no problems with older program compatibility, as I can dual-boot to which ever OS I need to run.

Windows 7 Pro is still available on ebay.

Peter Healey

A SWEET TOOTH FOR PCS

Happy New Year to you and the team at PC&TA.

I am an avid reader of this magazine and I am a retired veteran currently doing

a degree in 'C' programming online. I learn something from every single edition. Add to this the fact that I have a sweet tooth when it comes to my PC. Currently running an Asus Z170 Gaming motherboard, an i7 6700K, 16 GB of Dominator DDR4 RAM, an Asus GTX 970 a Samsung 951 SSD in a PCIE Slot. All this is custom cooled with an EK 360 mm loop.

Why? Would I use half the features and abilities? Probably not. Do I know it's total features and abilities? Probably not.

This got me thinking. What sort of computer do the PC&TA readers need or require? There is a big difference in requirements. Some people might do video encoding so need the extra cores, some might want to play flight simulators or have a driving set up in front of a 4K monitor, some might overclock, and then you might get those who just play Diablo and run Facebook, etc.

Maybe you could write a segment on each component, what it does, and what we the consumer require. For instance you just had an article on SSDs, SATA vs PCIE vs M2, etc. What does it mean to me though? What will I need? Do I transfer a lot of files? How fast do I really want my PC to wake up? Does my PC need to sleep? Wasn't that revolving around mechanical HDD's?

For my next build I want to expand with the Maximus VII Formula. I currently have one cooling loop and want to add and an extra GPU, those GPU's will be on another loop.

Why? Because I have the bug.

James Howden

Ben Mansill replies: *Thanks, James, for sharing your phenomenal passion for all things performance-PC. You are not alone in your love of the gear. For people like us there is no greater distraction!*

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Please limit letters to 200 words, where possible. Letters may be edited for style and to a more suitable length.



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TECH NEWS

The latest trends and products in the world of technology

BURNT OUT: HOW MOZILLA FIREFOX CAN KEEP THE LIGHTS ON

Mozilla has dropped its Google funding and shut down two revenue targeting projects. Is the end nigh for the developer?

Filling a \$300 million hole in a budget isn't easy for any company, but Mozilla is so serious about not taking Google's money for search referrals that it's refusing payment even when it could be charging.

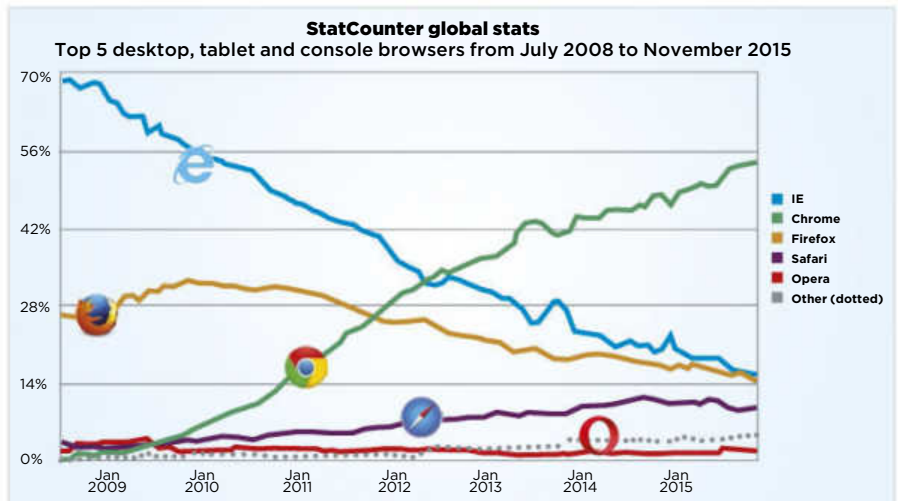
Last year, Mozilla cited competition reasons for why it would no longer take Google's money for search referrals – which was once responsible for 90% of Mozilla's income. The open-source company said it's since made up some of that funding thanks to search deals with Yahoo in the US, Baidu in China and Yandex in Russia. It's yet to find a deal in Europe, where Google remains the default search engine – a benefit it currently receives for free.

Publicly, Mozilla claims it isn't worried, with chief financial officer Jim Cook saying in a statement that the developer's situation is "really strong". However, the funding shift comes alongside other challenges, including announcements that Mozilla is shutting down Firefox OS, its mobile operating system, and Sponsored Tiles, ads embedded in the homescreen of the browser.

BEGINNING OF THE END?

Over the past seven years, Firefox's global share on desktop has slid from 26% to 15%, according to StatCounter, while Google's Chrome browser has climbed from nothing to 54%. "In many ways, it's natural to see Mozilla and Google drifting apart," Greg Taylor, research fellow at the Oxford Internet Institute, told PC & Tech Authority. "Their original deal was struck at a time when Firefox was the rising star of the web-browser market and virtually all browsing was done on the desktop. Now, Google controls the world's most popular browser and the world's most popular mobile operating system, which itself supports a growing share of browsing activity."

The failure of Firefox OS could be as



much a problem as the desktop decline, said analyst Jeff Kagan. "I think this Firefox OS problem may be the beginning of the end for Mozilla," he said. "While this was a good idea, it apparently isn't winning enough market share to make the effort worthwhile."

FIREFOX, WE NEED YOU

Taylor disagrees, saying Firefox brings benefits even for those who don't browse with it. "I think that Mozilla and Firefox have a valuable role to play in the vitality of the broader web ecosystem, so it would be a real shame to lose them," he said. "Of the other three major browsers [Internet Explorer/Edge, Safari and Chrome], two are not cross-platform, and all are sponsored by platform owners who might be suspected of having ulterior motives."

"We should expect that such competition helps to keep everyone honest, and may also be a spur for innovation in the sector," Taylor added. "Past innovations such as tabbed browsing or the unified address/search bar were rapidly imitated across the industry after their initial introduction,

which suggests that having another team of engineers working on ways to improve users' browsing experience is likely to have a positive impact on product quality across the sector."

MAKING IT PAY

The search deals with Yahoo and others will help replenish Mozilla's coffers, but with 90% of users turning to Google for search, Taylor noted that "it's not clear how happily consumers would embrace a browser" that used a rival. Despite Mozilla no longer taking Google's cash, its search remains the default in Firefox's search.

But Taylor said there are many ways the open-source developer can fund its work without Google. Mozilla could drive traffic to a web portal or build its own search engine. "But that would be a significant undertaking, so I consider it to be quite unlikely," Taylor added.

Mozilla could also push more for donations – it's now showing a donation message on homescreens, but it's a far cry from the insistent plea that Wikipedia shows on every page during its annual drive – or it could start selling services to corporates.

THE CASE FOR BETTER BATTERY LIFE

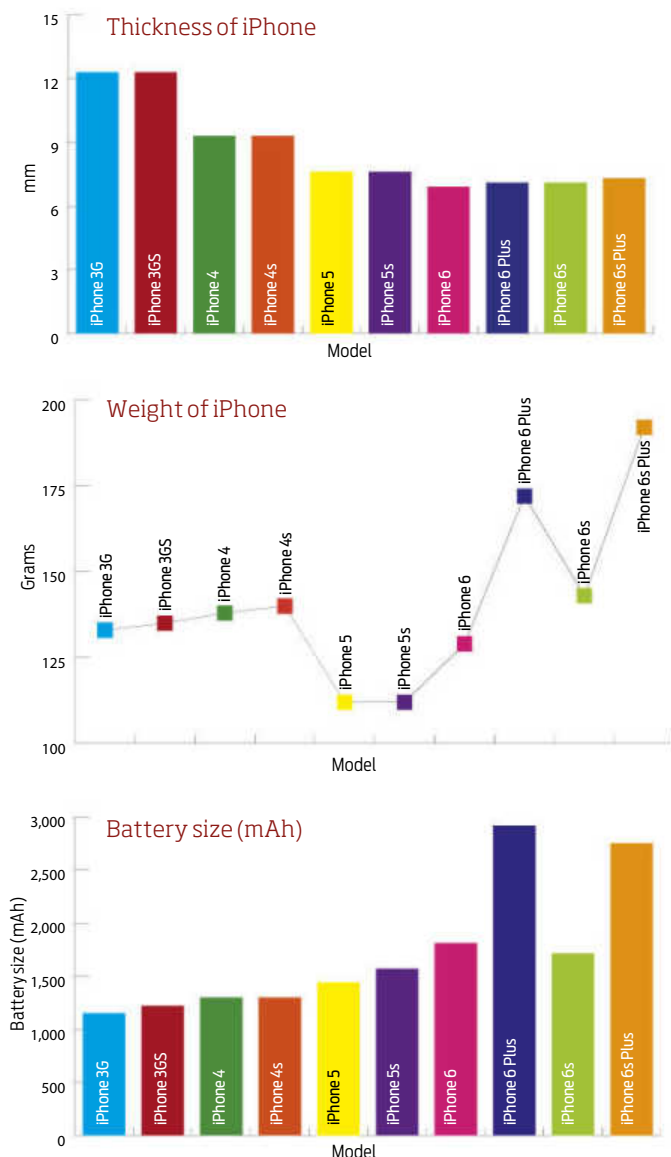
Many factors influence how long a phone lasts between charges. We chart the changes Apple has made to its iPhones over the years

Apple surprised many by offering a branded case for the iPhone 6, and not only because the clunky design isn't up to the company's sleek standards. The \$165 Smart Battery Case was seen as an admission that the iPhone is falling behind on battery life, featuring an integrated battery offering an extra 18 hours of time.

Apple steadily increased the iPhone's battery size until the latest launch: the iPhone 6s has a smaller battery than the iPhone 6. However, it doesn't mean users suffer, as there are other ways to extend time between charges than shoving a massive battery on it. Our own review suggested there's no difference in battery life between the 6 and 6s.

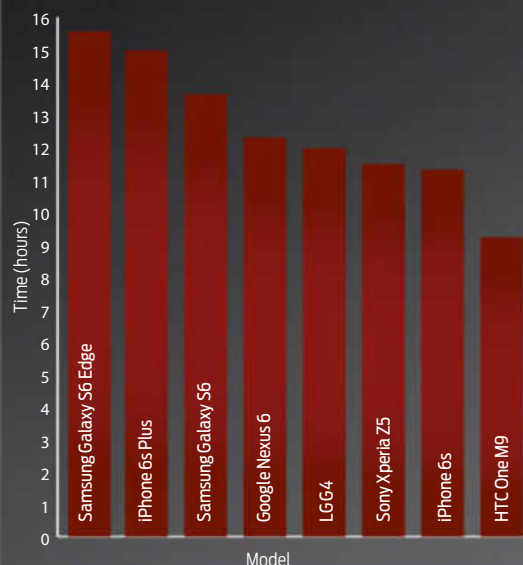
Larger batteries do mean bigger phones: while the iPhone progressively thinned from 12.3mm with the 3G in 2009 to 7.1mm with the 6 in 2014, it gained a few tenths of a millimetre this year.

In terms of weight, it hit its lightest with the iPhone 5 and 5s, putting back on the pounds – well, grams – with the 6s and 6s Plus the heaviest models yet.



BATTERY LIFE AND BATTERY SIZE

Size isn't everything, especially when we're talking batteries. A lot can influence how long a phone lasts between charges, from display size and pixel density to the chipset it uses and how well it's optimised. Consider the Google Nexus 6: it ranks mid-table in our chart of eight top smartphones' battery life in our video-rundown tests, despite having the largest battery of the bunch. Meanwhile, the Samsung Galaxy S6 Edge squeaks out an extra three hours between charges despite having a battery that's 620mAh smaller.



GAMING NEWS

Chris Pirina has gaming in his sights

AUSSIE PRICE WOES FOR VIRTUAL REALITY

While only US prices have been announced, maths suggests that the Aussie price will be far higher than expected

Oculus has opened up its finished Rift product (codename 'CV1') for pre-orders, leaving many tech fans from around the world scratching their heads in disbelief. The price has been announced as US\$599, which has turned many Australians away from the device after doing a quick bit of currency conversion and shipping cost maths, with forums filling with posts from gamers changing their minds about the now too-pricey headset. Kotaku Australia used a dummy pre-order and currency conversions to determine an estimated price for Australians, with the results revealing an overall AU\$1100 cost. Much of the frustration stems from Oculus CEO Brendan Iribe originally stating a desire for a \$300-\$350 price point back in 2013. Since then, early builds of the device have been announced with no change to the price, until the recent preorder announcement.

This change has left the product under scrutiny from VR enthusiasts, who are

now turning to the HTC Vive, which will go up for pre-order at the end of February. The Vive is already expected to have a high price-point, although no figure has been set, leaving a chance for HTC to undercut the Oculus.

Other concerns rise from shipping problems, with Oculus initially planned to ship shortly after the Vive opens for pre-ordering, however the date has twice been pushed back, first to May, which put Vive shipments ahead of the Oculus, and again back to June, furthering the gap between the rivals.

Meanwhile in the HTC corner, the company, may be looking to remove its name from the Vive, after Focus Taiwan published a report that claimed HTC wanted to remove the VR device from its smartphones unit by splitting revenue streams, separating them within corporate operations. The report speculated that "With HTC struggling to compete in the current Android smartphone market... the VR efforts

would be less at risk of collapsing if split away from the smartphones."

The VR scene has been booming beyond these two players, with Google manufacturing a very low cost alternative in Google Cardboard, being a chassis for your smartphone that runs with dedicated apps. A more technical build comes from Samsung with the Gear VR which is built using licensed technology from Oculus, and also uses a smartphone for display and processing with the Note 4 and Galaxy S6 currently supported.

Sony as well has been keeping itself in the big picture with PlayStation VR (formerly project Morpheus) which was set to be an industry favourite after Facebook's acquisition of Oculus and fears that the new product would not be faithful to the original plans.



MINECRAFT IS MAKING ITS WAY INTO SCHOOLS.

Don't tell them they're learning. And use the most popular game among kids too. That'll learn em.

Microsoft is making an official move into education thanks to its 2015 purchase of Mojang and its blockbuster hit Minecraft, with the new endeavour being dubbed Minecraft: Education Edition.

While the title may not exude creativity, many of the plans presented make up for it, with new features geared towards a more real world experience, albeit in Minecraft's signature blocky style. This allows teachers to guide students through foreign and ancient landscapes, such as the Pyramids of Giza and Pompeii.

There are also quality of life changes to help ease teachers into the use of Minecraft, like a new mapping tool for easier navigation, and a camera for scrapbooking. The changes will not be immense as Microsoft has stated a desire to keep Minecraft a game at its core, so there won't be any real changes to the way the education edition runs. The price is set for US\$5, making the game affordable, and because it's tied to a Microsoft account, students can continue work in the educational world with the same username.

Another big addition is a form of



crowdsourced lesson plans, teachers can design a world and a lesson plan that ties with it for free use elsewhere, with early examples ranging from a lesson on Japanese poetry to science work using bricks to create large scale molecules.



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CHIP NEWS

AMD conjures a silent Wraith then shoots for the stars, and please, don't throw pies into your Skylake. **Mark Williams** covers this month in chip news

CPU

THE 5.1GHZ CPU YOU CAN'T HAVE

Whispers are going around that Intel has cooked up a quad core CPU that has the highest out of the box clock speed Intel (or AMD for that matter) has ever made. Unfortunately it's not something you're ever likely to see on sale anywhere. Firstly, it's a Broadwell-EP Xeon class product apparently with the model number E5-2602 V4, so it's built for workstation and server workloads. Secondly, the same whispers also say that it'll be an OEM part only and won't be publically available.

As fun as owning one of these could conceivably be, there is one slight problem. To achieve those high clocks, the TDP of the chip is a rather hefty (by Intel standards) 165W.

AMD UNLEASH A WRAITH

Speaking of high TDPs, with AMD stuck in the 28nm quagmire until year's end, many of its products have to deal with significantly higher TDPs, in some cases up to 220W. Dissipating that kind of heat is no small task for stock air coolers, in fact those high end TDP CPUs will still come with a liquid cooling solution, however their CPUs that can be cooled by air (up to 125W) will start being bundled with a new stock HSF, dubbed Wraith.

The Wraith improves upon the current stock HSF combo in just about all the important ways. It's substantially wider and taller with 24% more surface area,

the fan is now larger and deeper allowing it to generate 34% more air flow while at the same time being ten times quieter than the high pitched whiney current solution. And to finish it off AMD have added a nice black shroud around the fan assembly giving it a good feel of quality versus even third party offerings. An impressive stock cooler.

SKYLAKE BUG

The Great Internet Mersenne Primes Search (GIMPS), the folks that recently discovered the newest prime number (274207281-1 for those interested) and whom maintain the Prime95 prime number crunching software often used

for CPU stress testing, helped discover a bug on all Skylake CPUs that causes the CPU to hang or behave unpredictably.

The bug surfaced when performing fast furrier transform calculations (used to calculate Prime numbers) that in particular have an exponent of 14,942,209. This bug however isn't limited to Prime number calculations, it could affect any calculation intensive task.

Intel confirmed the bug and has already released a fix which they're working with motherboard manufactures to push out. So if you own a Skylake based system it might be worth looking for a BIOS update to fix this issue.

▼ AMD's impressive Wraith stock HSF solution



GPU

POLARIS SHINES BRIGHTLY

At CES AMD was proudly showing off a demo of its next generation of graphics card. While they don't have an official product name yet, AMD did reveal that they will be moving on from the island code names (like Tahiti and Tonga) for their GPUs, and moving to the stars for their 14nm node products.

Polaris (named after a star in the constellation Ursa Minor) is the codename AMD has chosen for this first 14nm product. They actually have two Polaris products in the works, Polaris 10 and Polaris 11. Polaris 10 being a

"console class" product in terms of performance and will be aimed at thin and light notebooks. While Polaris 11 is an enthusiast product for desktops. Polaris 10 was at the show running a tech demo. Sitting side by side with an identical system using an Nvidia GTX 950. The total system power running Star Wars Battlefront at 1080p at 60fps for the Nvidia system was 140W whilst the Polaris system was getting by using only 86W!

Some back of the napkin maths, using the GTX 950's known actual load power consumption of 101W, places the Polaris

10's actual usage at about 55W. So you can immediately see here just how much of an improvement 14nm FinFET technology is going to make this coming generation, and just how much headroom it will open up at the top end.

With a working tech demo of Polaris, and Nvidia's bluff being called when it showed off its Drive PX 2 automotive product claiming its next gen Pascal was on board (which was later debunked by keen observers due to die size discrepancies) it certainly seems like AMD might be the one to launch their next gen cards first later this year.

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MOST WANTED

Rob North finds this month's shiny tech diamonds

RED Scarlet-W

RED Digital Cinema made a name for itself by undercutting its competitors on price, and the company's new entry-level professional grade cinema quality camera takes things to new levels of relative affordability, making it the enviable weapon of choice for those looking to graduate from prosumer to budget-conscious fully-fledged professional.

MOST WANTED: Capable of capturing 5K footage at 60fps, 4K at 150fps and 2K at 300fps, and with integrated mounting points and interchangeable lens mounts, the Scarlet-W is a 1.5kg camera built to be as adaptable as possible. If you want it but it's a struggle to purchase it outright unless you have a heap of film work lined up - the base package will set you back US\$14,500 - but at that price day and week rate hires should be cheap as chips.

NOT WANTED: Granted, you're still going to need to invest in a good lighting setup. And if you're tentatively getting into indie filmmaking don't be afraid to use last year's pencils.



Axis VidiuS

Lightweight, astonishingly small and with a tiny camera mounted on the front of the body, Axis VidiuS is the world's smallest drone to offer first-person live streaming and recording.

MOST WANTED: Controllable via an Android or iOS device, or the included 2.4GHz controller, the miniscule drone measures just 4.3cms across either side and 2.5cms tall, weighing less than 250 grams. Capable of performing 360 degree flips and rolls, it has three pre-programmed speed settings and 6-axis gyro stabilisation to assist even the greenest of drone pilots out there.

NOT WANTED: Though the mounted camera is decent enough for providing real time vision, it'll only save a decidedly mediocre 420p resolution recording. Combine that with a lack of image stabilisation, and your in-flight clip will be more a motion sickness inducing mess than the cinematic masterpiece you were hoping for.

SCiO Scanner

Wouldn't it be great if you could tell the exact chemical makeup of your food? Well, thanks to the pocket-sized handheld SCiO molecular scanner, now you can.

MOST WANTED: The scanner uses the near-infrared spectrum to analyse the light reflected from objects and identify their unique optical signature, which is then sent to a cloud-based database via your paired smartphone and instantly matched with an existing item to give you an indication of your food's caloric, carbohydrate, protein and fat content.

NOT WANTED: Access to the database of over 600,000 food items requires a monthly subscription fee, undisclosed at time of writing. Plus, the scanner can only currently read homogenous foods - that is, those with a uniform mixture throughout - so you won't be able to identify the make-up of soups, salads and chocolate bars.





Lenovo Ideacentre 610S

When we first glanced our eyes across Lenovo's new miniature home theatre PC its unique and stylish triangular design immediately caught our attention. But this compact powerhouse's real drawback, earning it a place on this month's Most Wanted list, is the detachable projector.

MOST WANTED: Complete with an internal 2w speaker and a tripod mount when detached, the projector can splash a 100 inch image at 720p onto a wall just 2.4m away, making it perfect for those short on space. Under the hood, the PC itself features an Intel Core i7 processor, a 2GB Nvidia GTX 750ti graphics card and up to 16GB of RAM.

NOT WANTED: It goes without saying that the image quality from the projector will pale in comparison to a 4K idiot box, and though the specs are surprisingly good given the small form factor, unless you're satisfied with casual gaming you'll be traipsing back to your console or high-end rig to play the latest releases.

Sphero Force Band

Sphero's remote control BB-8 replica was one of the coolest tech toys of 2015. Now, the company are working on the Force Band, a wristband wearable that'll allow you to control and interact with your spherical droid sidekick through hand gestures and movements regardless of how attuned you are to the Force.

MOST WANTED: Based on the prototype seen at this year's CES, the company's first wearable device features a gyrometer and accelerometer allowing you to put down your smartphone and drive BB-8 by swaying your arms and using your hands. Thrust your palm outward and BB-8 will be 'force pushed' forwards, or point your palm towards yourself to 'force pull'. You can also increase BB-8's speed by moving your palm closer to the floor.

NOT WANTED: We're excited, even if we have no idea how much it'll cost, or what the effective range of the Force Band will be. It would have been even more exciting if Sphero had focused on an app for our existing Apple Watch, Android Wear and Pebble devices.



Razer Core

What if you could hook up an external graphics card to your laptop? It's a question many of us have asked or answered over the years - we've seen a lot of jerry-rigged solutions, and even a few custom propriety eGPU docks. But now with the Thunderbolt 3 standard available and integrated into USB-C ports, Razer is unleashing a potential game changer - the Core.

MOST WANTED:

Capable of accommodating pretty much any dual-width PCI-e 16x card drawing up to 375W, the Core is marketed as a dock for the new Razer Blade Stealth Ultrabook, connected via Thunderbolt 3, with four USB ports, an Ethernet port and Chroma lighting. But the Core could theoretically work with any laptop with a Thunderbolt USB-C port (provided the manufacturer supports the hardware).

NOT WANTED:

Though quick, Thunderbolt 3, of course, can't offer the same bandwidth as a PCI-e 16x slot meaning the Core will act as a bottle neck that could prevent your GPU from living up to its full potential in some instances.



Netflix Socks

Netflix Socks is the second simple step-by-step DIY project from the popular streaming service, providing the perfect garment for when Netflix and chill actually means Netflix and chill.

MOST WANTED: Equipped with an Arduino microcontroller, accelerometer and two wide-angle IR LEDs, Netflix Socks will automatically pause your program if you stop moving for a prolonged period of time - say, if you fall asleep during a late-night binge session. And for when you haven't fallen asleep a small LED on the cuff will light up before the pause signal is sent so you can quickly move and keep your show or movie rolling.

NOT WANTED: Given its use of an IR signal, you're going to need a visually unobstructed line of sight between the socks and your TV. What's more, though it's no fault of the design itself, the mere thought of wearing socks in the Australian summer has us sweating already.

System news

DO YOU LET YOUR MOUSE ROAM FREE ON THE VAST PLAINS OF YOUR DESKTOP, OR DO YOU PAMPER IT BY CONFINING IT TO A PREMIUM SURFACE IT'LL MORE HAPPILY RUN AROUND ON? THIS MONTH **MARK WILLIAMS** LOOKS AT THE WORLD OF MOUSE PADS



If you're old enough to remember using computer mice with track balls in them you would have been as equally relieved as I was when I got my first optical mouse. Gone are the days of cleaning out dust and muck from tricky little rollers inside, no more random cursor movements and no more angrily pressing the mouse down as hard as you can into the desk while cursing at it in a vain attempt to make it do your bidding.

Mouse mats came out of that era as a solution to a problem. Giving the track ball as much traction as possible so your movements would register correctly. However with the advent of the optical mouse, all of a sudden that necessity went away.

With modern mice now able to work on any surface you can possibly think of, even glass, you'd be forgiven for not using a mouse pad these days. So why are they still a popular accessory? Much of it comes down to what you want to achieve and personal preferences. Perhaps you just want to protect a nice expensive desk from the wear and tear of something being constantly dragged over it, or instead of the desk, it's the nice silky smooth feet of your expensive new gaming mouse you want to save from the harsh damaging surface of the desktop. Ensuring a durable surface and longevity of the mouse feet in and of itself can be a decent enough reason, but there's still more to consider.

What you use your mouse for is just

as an important a factor. Most high end mouse pads cater to one of two types of usage cases. Control or speed. If you're a graphics artist, you'd likely desire more control and accuracy when creating your artwork, so a pad that has a grippier surface, often of cloth, for more precise handling can aid with high DPI mice, helping them go (and stop) exactly where you desire. A gamer on the other hand would care more about being able to spin about quickly to take their next headshot, that is where the speed mouse pads come in. With often rigid surfaces coated in exotic materials that are designed to combine well with modern Telfon mice feet to provide an effortless glide allowing for some impressive mouse movement speeds and gaming reaction times.

There is of course the personalisation factor. Jazz up your desk with a mousepad that has your favourite character or hero on it, or even one that has customizable RGB LED lighting to perhaps match your mouse, keyboard or PC lighting schemes.

Finally there's ergonomics. Some pads even include a wrist rest containing a soft gel to save your wrist from the hard desk surface when mousing for extended periods.

So as you can see, even though they're strictly not needed these days, there's still plenty of reasons to consider using a mouse pad to improve your daily mousing experience.

SHOP TALK

With optical mice being common place, are mouse mats still a popular choice for your customers? Why should they still be considered a worthy purchase and what should customers look for when considering them?

John, TI Computers:

"Yes, absolutely. Quality mouse pads such as the ROG Whetstone still remains popular among my high performance system customers, especially customers buying for gaming and design purposes. A good mouse pad can easily deliver smoother and more accurate movements, allowing my users to maximize the performance of a quality high DPI mouse, which in effect will result in better work efficiency. Though many mouse pads may look similar, a quality mouse pad will generally focuses on maximizing either the smoothness or accuracy of mouse scrolls using various materials and patterns. Superior non-slip base will also help to prevent discomfort due to slipping mouse pads often found on cheaper ones. At the end of the day, we will always advise customers to try out a mouse pad with the mouse of their desire if they are not a matching pair from the manufacturer for best results."



▲ Don't underestimate the comfort value of a wrist rest!



▲ Razer's Chroma mouse pad glows and colour cycles for the ultimate is silly but heavenly bling

Market snapshot

A SAMPLING OF SYSTEMS AVAILABLE THIS MONTH

THE SLASHENING

PC Case Gear Bloodclaw 960

\$1099 • <http://tinyurl.com/h64vzav>

Do you have a little dinosaur in your household that needs to be let loose in Ark: Survival Evolved so they can go terrorise their prehistoric friends? This is a system that can achieve that with ease. Very well priced for a gaming system it offers some reasonable specs for a first gaming system or those on a budget.

The CPU is great for budget gaming systems however it really does need to be overclocked to achieve that, so be prepared to play around a little in the BIOS if you want the full potential from it. The hard drive is a negative. It's small by today's standards and not particularly fast. An SSD should be the first thing on any future upgrade list with this system.

KEY SPECS

CPU: Intel Pentium Anniversary Edition G3258
Cooler: Stock OEM
Motherboard: MSI B85M-E45
Graphics: Asus GeForce GTX 960 Strix DirectCU II OC 2GB
Memory: Kingston HyperX Fury HX318C10FRK2/8 8GB (2x4GB) Red
Storage: Seagate Barracuda 1TB ST1000DM003
Power Supply: EVGA 500B 500W
Case: Nanoxia Deep Silence 4 Claw Black/Red



EXTREMELY XTREME

NetPlus Micro Computers NetPro Xtreme! Computer

\$3799 • <http://tinyurl.com/j79m7mv>

If you want a system package that does it all, this is almost it. Based around the workstation grade Intel i7-5930K it certainly has the CPU grunt for anything you might throw at it. For this price you'd expect the graphics card to be a GTX 980 Ti or better, and you'd be right until you notice that this package also includes a 27in monitor, wireless keyboard and mouse and a Blu-ray writer.

The only thing missing really is some speakers, which at this price, really should be included. A professional version of Windows 7/8.1 is included, handy for those needing to attach this to a work domain.

KEY SPECS

CPU: Intel Core i7-5930K
Cooler: Not specified
Motherboard: Unspecified X99 Enthusiast board
Graphics: Nvidia GTX 970 OC 4GB
Memory: 16GB G.Skill 2133MHz DDR4
Storage: 480GB SSD, 2TB Western Digital HDD
Power Supply: CoolerMaster V850 850W
Case: CoolerMaster CM Storm Trooper SGC-5000KWN1



CHUCK NORRIS NOT INCLUDED

Mwave DeltaForce Recon

\$1499 • <http://tinyurl.com/zz5zbpm>

This M-ATX system sits nicely in the sweet spot in terms of performance per dollar. The case with these components still has a lot of spare room inside, and with this particular case being so reconfigurable in how you can rearrange the innards, this is a system that could easily last you a few parts upgrade cycles.

The CPU and graphics card are great at this price point but for a gaming system the lack of size on the SSD is a draw back. 120GB is barely enough to get the OS and programs on and perhaps one AAA game title.

The 1TB spinning HDD is nice, but I think I would have preferred they did away with it and doubled the SSD capacity.

KEY SPECS

CPU: Intel Core i5 4690
Cooler: Thermaltake Water 3.0 Performer C
Motherboard: Gigabyte GA-H81M-S2H
Graphics: Gigabyte Radeon R9 380 OC WindForce 2GB
Memory: Kingston HyperX Fury HX318C10FRK2/8 8GB (2x4GB) Red
Storage: Intel 535 120GB 2.5" SATA III SSD, Seagate Barracuda 1TB ST1000DM003
Power Supply: Thermaltake SMART 650W
Case: Thermaltake Core V21 Micro Case



WE LIKE SENSIBLE NAMES

BudgetPC Essential PC & Software Bundle

\$699 • <http://tinyurl.com/h3m3opn>

Just need a computer to browse the internet on, stream Netflix or get some of that pesky homework done? This system would serve you well. The case's aggressive design is probably the high point with this system as everything else inside is basically one step up from the lowest gear you can buy.

Having a Wi-Fi N spec adapter included is nice, giving some networking flexibility, and the included 1 year subscription for Office 365 will definitely help with school work.

And although you mightn't think it, quite a few games like Minecraft and other indie titles would still be quite serviceable on this too. After the homework has been done I'm sure.

KEY SPECS

CPU: Intel Core i3-4170
Cooler: OEM
Motherboard: Asus H81M-Plus
Graphics: Onboard
Memory: 4GB 1600MHz DDR3
Storage: Western Digital Blue 1TB
Power Supply: Silverstone 500w Strider Essential
Case: Cooler Master K380



LIMITED ISP CHOICE

Anthony Caruana addresses a reader's trouble with finding a suitable ISP and service when moving house

There are few topics that will make us get more hot under the collar than dealing with ISPs when moving house. This is something I've faced personally recently, moving from a house serviced by several ISPs offering multiple connectivity options to one, just a few kilometres away, with only one option that was slower and more expensive.

That's why a letter from Tony Clifton caught my eye.

Tony says:

"I've written to NBN Co a few times and can't seem to get any reply on any matter that doesn't consist of cut and paste from a PR blurb. I'm with an ISP that sells me an ADSL2+ connection with download speeds that range from 17Mbps to 20Mbps but if there's rain for a few hours the connection drops down to 0Mbps. They include 200GB of data and \$50 of VOIP calls for \$60/month - the upper limit of my budget.

I was thinking of moving to a new house, it's already connected to the NBN so I researched plans that suit my usage and are within my budget.

The Retail Service Providers have customers over a barrel - a customer can't sign up for a budget phone-only plan that isn't more expensive than the Telstra copper".

NBNCo's mandate is to "design, build and operate Australia's new broadband network". If you think of the NBN as being roughly analogous to the power system, NBNCo is building the poles and wires to connect our homes and workplaces to the the network.

However, while energy prices are controlled through government-mandated tariffs or other consumer

protection measures, the rules for retail offerings from ISPs are different. This is why rural and urban customers often see different plans and prices.

Tony also asks what the wholesale cost of NBN data is.

With the NBN, there are many different types of connectivity on offer. We have friends in rural areas with satellite connections, others have access over fiber optic cable that was installed when the rollout commenced under the previous Labor government while others will get access using HFC cables that were deployed

"It's important to note that where NBNCo refer to customers, they don't mean you and me. They mean retail service providers who on sell connectivity to the NBN to you and me."

by ISPs with another infrastructure to be deployed using the Fiber to the Node option favoured by the current government.

NBNCo does publish their wholesale prices. A web search for "nbn wholesale charges" reveals a document about NBNCo's wholesale pricing approach with details of different service tiers.

It's important to note that where NBNCo refer to customers, they don't mean you and me. They mean retail service providers who on sell connectivity to the NBN to you and me. And while the market is somewhat dominated by the three largest ISPs in the market – Telstra, Optus and TPG – there are dozens of other providers selling NBN connections. However, they don't all service all areas.

One of Tony's issues is none of the plans available at his new place can match the balance of price and throughput he currently enjoys. But it's important to note the variable connectivity Tony describes – maximum speeds of 17Mbps falling to zero – should not be a factor if he manages a

connection that's affordable.

Tony also wonders if the NBN wholesale prices are in excess of those charged for ADSL and, if they are, why that might be the case. It's important

to note ADSL operates over the existing copper network which has been paid for over many years and the ACCC has directed Telstra to reduce the wholesale costs of ADSL to resellers. Comparing the prices of the two technologies isn't an apple to apples comparison.

So, where does that leave Tony. ISPs are commercial

companies that only offer their services where they can make money. And we don't live in a country where every premises has access to multiple, competing options – something I've learned the hard way and Tony has also discovered.

One last thing – Tony also asks "How can an old aged pensioner get a simple landline for about what it costs now (say \$30/month plus call costs)?"

Certainly, finding phone-only plans from ISPs offering NBN connections is tricky. But they do exist with prices ranging from around \$22.95 per month with Telstra's T-Voice budget plan or Internode's Fiber Phone option for \$29.95.

NEED HELP? EVER HAD AN ISSUE AS A CONSUMER? INVESTIGATOR CAN HELP.

If you've had an issue or had something happen and you think investigator could help, email your problem to investigator@pcandtechauthority.com.au



Anthony Caruana

has worked for almost every major masthead in the Australian IT press. As an experienced IT professional – having worked as the lead IT executive in several businesses, he brings a unique insight to his reporting of IT for both businesses and consumers.



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Back to School Tech Guide

SOFTWARE AND HARDWARE TO MAKE THE SCHOOL YEAR MORE PRODUCTIVE



It's that time of the year again - time to go back to school, uni or wherever you do your learning. For those just starting school, working towards finishing school or toiling away at university, there's hardware and software that'll make your life easier. We've come a long way from folders full of illegible notes and answering worksheets in exercise books.

TABLET APPS HELP YOUNGER KIDS REVISE AND STUDY

For the kids just starting out in primary school, there's many high quality apps for tablets that reinforce the things they learn in class. Australia's own Shiny Things makes some of the world's best educational apps for the iOS platform. Its Quick Math range assists children between 6 and 11 to fortify their arithmetic skills and the Quick Clocks range helps kids learn to tell the time.

The highly rated Montessori Learning Bundle packages up five apps to teach children basic reading, writing and math skills, as well as a fun geography app to learn the locations of countries and their capital cities.

KHAN ACADEMY'S EXCELLENT TUTORIALS FOR OLDER KIDS AND ADULTS

Khan Academy is an awesome resource for students of all ages who need a helping hand trying to understand the topics they're struggling with at school. The site and corresponding tablet and smartphone apps are full of highly detailed videos from experts,

explaining various topics. Whilst some tutorials are focussed on US syllabus, there are loads of basic tutorials on math topics such as geometry, arithmetic, area, measurement and algebra. Khan Academy covers many other topics such as biology, physics, chemistry and even computing, suitable for those starting these subjects at uni, or studying them at secondary school.

AN EXCELLENT NOTE TAKING EXPERIENCE

Microsoft's Office suite is almost mandatory for most students to be able to create presentations, design and construct reports and to use OneNote to collect their thoughts and conduct research. Microsoft's website (www.onenote.com/students) has some excellent tips on how students can use OneNote, including using OneNote on your smartphone to take a photo of whiteboards and sharing notes amongst your classmates. OneNote is incredibly powerful and is designed, not surprisingly, for note taking - a skill imperative to success in the later years of secondary school and university.

Microsoft also offer a free version of Office 365 to K-12 students with an edu.au email address. Most universities offer Office 365 for free too as part of a site licencing deal the uni has with Microsoft. Just search Google for the name of your university plus Office 365 and chances are you'll find the uni's instructions on how to get your free licence. If your uni doesn't offer it, there's also a \$99 4-year subscription (as opposed to \$119/year) available to eligible students.

SYNC YOUR TIMETABLE ACROSS ALL YOUR DEVICES

For the students at university, knowing your timetable inside out is imperative. After shelling out all the cash to attend the course, you want to at least turn up on time. If you aren't already taking advantage of the calendar app on your smartphone and syncing it across all your devices, now's the time to implement it. The syncing platform you use primarily depends on the computing platform you use.

If you're using an Android smartphone, sticking with Google Calendar is best. It will sync to almost any other platform, so if you're using Windows on your computer, almost every calendar app, including the built in calendar will allow you to sync and edit your schedule. On iOS and the Apple platform, using iCloud is the preferred choice. That said, they're all quite cross platform these days - even Microsoft offer a free Outlook account that will sync to any device, including Mac, Android and iOS.

BACK UP YOUR WORK!

Something all students should keep in mind is backing up their work. There's nothing worse than creating all these useful notes, preparing assignments or completing homework, only to have it all lost due to a dud hard drive, malware or user error. I could go into a whole two-thousand-word article about backups, but to keep it simple, use something like Crashplan with an external hard drive combined with their cloud backup service.

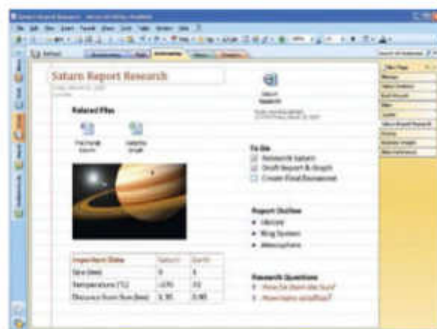
✓ Sakura Quick Maths has proven to be an excellent tool to help improve your maths skills



✓ Khan Academy is a study aid that covers a huge variety of topics



✓ Even after all these years OneNote reigns supreme as the best note taking app



At the very least, hook up an external hard drive to your computer and use the built in backup system in Windows or Time Machine on Mac OS X. If you want to do your backups properly, adhere to the 3-2-1 rule of backups. Three copies of the data, on two different types of media and keep one copy off-site.

LAPTOPS

Despite all the rage about tablets and smartphones, a laptop is still the student's best friend. Depending on your needs there's dozens of laptops that'll suit, but there's two that stand out on opposite ends of the price spectrum.

The Dell Chromebook 11 is one of the best Chromebooks on the market right now is Dell's Chromebook 11. It's supremely rugged due to its MIL-STD (US military standard) rating. It does this whilst remaining lightweight (1245g) with over 7 hours of battery life. The ideal laptop to chuck in a backpack and have it manhandled by children and teenager. ChromeOS has matured significantly and is gaining popularity in many schools across Australia.

Microsoft Surface Book is a tasty choice if you're after the absolute best and fancy a tablet/laptop combo, Microsoft's new Surface Book has you covered. Not only is it a top-spec laptop, it's also a great Windows tablet. Combined with OneNote and the Surface Pen, it's a brilliant note taking device. At a starting price of \$2,069 it might be a stretch for most students, but if you can afford it, it won't disappoint.

SMARTPHONES

Chances are every student already has a smartphone, but if you need a new one to start the school year off with, there's some great value for money models available.

Microsoft Lumia 532 - this little guy is only \$49 from Telstra and often on sale for only \$29 at Woolworths. It runs Windows Mobile 8.1 and will soon receive an update to Windows 10. Despite the low price, it is fully featured. It will sync perfectly with all your Google or Microsoft cloud services and runs



▲ A student laptop can be something fabulous and expensive, or simply cheap and basic

Microsoft Office. For most students, this is all they need and for the price, you can't go wrong if it's lost or stolen.

Google/LG Nexus 5X - after a recent price drop, the Nexus 5X becomes even more compelling as a very competent Android

“For the students at university, knowing your timetable inside out is imperative. After shelling out all the cash to attend the course, you want to at least turn up on time.”

phone. The Nexus 5X's main selling points are the lack of bloatware seen on most other Android phones and the fact it gets Android OS updates direct from Google, unlike most Android phones. At only \$547 for the 32GB model, it is probably the best value for money smartphone on the market today.

STORAGE

Backups prevent the nightmare scenario of losing that assignment you worked so hard on because the hard drive in your laptop decided to die. Flash drives and portable HDDs are great for taking work from home to uni if you can't rely on cloud syncing services. Western Digital Elements 3TB

Desktop - currently the 3TB hard drive capacity range provides the best dollar per gigabyte value and Western Digital have a long track record of quality disk drives. This unit requires an external power pack, so isn't the most portable.

It can be frustrating having to rush out the door but you're stuck waiting for a file to copy across to your USB flash drive. Using a fast USB 3.0 unit like the Corsair Flash Survivor range will let you copy files over in a flash, unlike cheaper drives. It's constructed from aluminium, is water proof and can handle drops from 200 meters, so it'll survive even the clumsiest students bag.

PRINTERS

Most students will probably cope with a cheap mono laser, but if you have more money to spare, multi-function colour printers can be extremely handy.

Brother HL-1100 - this printer currently retails for \$37. Yep, \$37. It's a monochrome laser with USB support and is the definition of no-frills. Text is crisp and the consumables not too expensive, particularly with 3rd party products.

HP Officejet Pro 8620 is an excellent ink jet, and whilst not as cost effective for mono printing as a laser printer, if you require printing out high quality photos and graphics and need a scanner too, the HP Officejet Pro 8620 is \$229. It's one of the highest quality units in this price bracket, has all the bells and whistles and the consumables are reasonable in cost. ●

▼ Absolutely essential is a good calendar that syncs across multiple devices



▼ Your important data needs to be secure as well as portable



▼ A reasonable printer is cheaper than just one fancy lunch once you graduate and get a job







CAN YOU BUILD YOUR OWN **SMART HOME?**

CHRIS PHIN EXPLORES THE PRACTICALITIES OF
A DIY SMART HOME AND, WITH A LITTLE HELP,
REVIEWS EIGHT GADGETS YOU CAN INSTALL IN
YOUR HOUSE TODAY

Wi-Fi kettle. Try that again in your best Peter Kay voice. "Wi-Fi? Kettle?" Yes folks, welcome to a world where you can buy a kettle that connects to your network. That means you can boil water from any room in your house, rather than having to actually be in the kitchen like some kind of caveman.

While this sounds mildly preposterous - the kettle will, after all, have to be pre-filled, which involves you being physically near, and you'll have to trudge to the kitchen to make the tea once the thing has boiled - it's nevertheless the moment when the long-yearned-for utopian vision of the smart home is finally sputtering fitfully to life.

But how easy is it to give your home smarts? What kinds of things can you do? And, in the end, does any of this tech bring genuine benefits, or are we drawn to the idea of adding a CPU and IP address to everything because we geeks just like tech? There was only one way to find out: add the smart-home devices to my flat and live with them for a while.



THE LANDLORD BARRIER

We drew up a list of kit, ensuring I represented most types of smart-home equipment - and this was where I hit my first problem. My wife and I, like much of the population, rent our unit, meaning some of the really exciting stuff - tech that builds into the very fabric of your home - was off limits because our landlord wouldn't allow it. I wanted, for example, to replace the Yale lock on the front door with the Schlage Sense lock. This uses Bluetooth so you can unlock the door with your iPhone and, since I'm much less likely to forget that than my keys, it would vastly decrease my chances of locking myself out. Indeed, because you can unlock using spoken commands with Siri, even if I manage to lock both my phone and my keys inside the house, I should be able to issue the command via my Apple Watch if it's within Bluetooth range (or just punch in the lock's backup PIN).

Similarly, since we are forced to endure the pointless charade of storage heaters, rather than proper central heating, there was no way I could test a Nest, Hive, Tado, Ecobee3 or any of the other smart thermostats now on the market. For reviews of these, I turned to my colleagues Jonathan Bray and Alan Lu. Similarly, mains-powered smart smoke detectors were ruled out. You can't blame the landlord - who knows if these devices will be supported by the time you hand back the keys.

That means, for a large proportion of the population,

the promise of the smart home is scuppered before they even begin - not by the limitations of technology, budget or compatibility, but simply because of the wider socioeconomic climate in the UK.

The acceptable smarts

However, there are still plenty of things I could add. For instance, there are dozens of companies selling smart lightbulbs - including the Pulse by Sengled, which also works as a speaker - but Philips is still the daddy with its Hue system. What started as a basic kit consisting of three bulbs and a bridge for connecting them to your LAN - with brightness and colour being controlled from your phone - has now grown into a broad range including lamps, light strips and the delightfully geeky Hue Tap, a programmable light switch that is powered by the act of pressing it. I also have the Hue Go, a wonderful little battery-powered bowl of soft light, which hooks into the system.

We love the flexibility and personalisation of the Hue lights, and the fact that they are now HomeKit-



compatible means I can just raise my wrist and say "hey Siri, turn off the lights in the bedroom". This is both pleasingly Star Trek and useful - as are optional geofences to turn lights off automatically when you leave. There was one occasion, however, when I had failed to properly link my wife's iPhone to the system, which led to a plaintive text message asking me to switch the lights on in the living room when I was a hundred miles away.

The Wi-Fi-connected devices from Withings are also terrific. Our baby monitor, for example, connects to the Wi-Fi network, and because it works with an app, we can repurpose old iOS and Android devices as monitors. I set up our old iPad in the kitchen so that there's a permanent station for keeping an eye on our daughter. If we wanted to add additional screens to, say, the most popular standalone baby monitor on Amazon, we'd be looking at \$150 a pop, but even if you don't have a retired iPod touch in a drawer, you can pick one up on eBay for a fraction of that. Being able to see my daughter sleep when I'm away on business is also a bittersweet joy.

Withings' smart scales are fab. I stand on them after my shower and they automatically send my weight and body-fat percentage to the cloud. Being able to see your weight creeping up long before you notice your waistband tightening can make a huge difference. Moreover, because Withings has made its app talk to Apple's system-wide Health framework, I can launch the

▲ LEFT: The Hue Go is a small, battery-powered bowl of light that plugs into the system

ABOVE: Withings' smart scales send your weight and body-fat percentage to the cloud

Health app and simultaneously check the weight data coming from the scales, my “number of flights climbed” from my iPhone and number of miles walked from my Apple Watch.

That kind of OS-level, manufacturer-agnostic data collection is key, not only to Health, but to the entire smart-home concept. The major source of friction and overhead in this experiment has been that, although you can buy a smart “this”, a Wi-Fi-connected “that” and a Bluetooth-enabled “the other”, each has its own mobile app and interface. This means not only signing up for new accounts – which is increasingly tedious, and carries the risk that I’m just creating more opportunities for my details to leak – but also having to get my iPhone, unlock it, find the app and then navigate a custom UI. This, simply by dint of being different from any other, slows me down in tiny, but galling, ways.

COME TOGETHER

But there’s hope. I’m more comfortable than ever making hubristic statements about 2016 being the year the smart



“will this work?” – since it’s not one of the official scene-setting commands Philips lists – I tried “hey Siri, turn the lights down a bit in the living room”, and it was parsed and acted on. It’s not quite Iron Man’s Jarvis, but it’s still exciting. Triggers are coming too, so that you could, say, have the light in your bedroom turn blue when the thermometer outside records a temperature under 5°C, warning you to seek out your thermal undies.

A BRIGHTER FUTURE

The bad news is that there are very few devices out there compatible with HomeKit – and fewer still with Brillo – and that even those pioneering systems have teething problems. For example, I still can’t access them from outside the flat, despite the presence of two signed-in Apple TVs, which should act as gateways, and my extensive troubleshooting.

The good news is that, when it works, it’s not only useful, but also a little bit wonderful. The more aware and context-sensitive our homes become, the more complex behaviours can be built that start to approximate the experience of having your own butler, who does your bidding either on command or automatically. That sounds like the kind of future I want to live in.

We come back to the Wi-Fi kettle. Unless it’s a bad kettle, unless it doesn’t work reliably, or unless you can’t or don’t want to spend a hundred quid on a kettle (all distinctly reasonable objections), why not have one that has Wi-Fi? It will continue to operate as an ordinary kettle, but can also offer to boil itself when you arrive home. You don’t need to do this every time for it to be a welcome feature.

SMART RENTING

Smart homes have long been over-hyped, and I don’t want to get caught in that trap. But it’s the first time ever, even for someone in a rented property, that I’ve caught a glimpse of its real and achievable promise. It’s now tangible, rather than being something that is forever locked away in a bright, but ultimately fatuous, illustration of “The Home of Tomorrow” in a glossy American magazine from the fifties. Hey Siri, deliver on that promise.



▲ The baby monitor from Withings allows you to repurpose old iOS and Android devices as cameras

home started to move out of its tech niche and into the mainstream. Google has its Brillo platform and Apple has HomeKit. Apple is criticised for creating walled gardens, pretty places that lock everyone else out. However, with HomeKit, it’s striking a balance between an impossibly anarchic free-for-all and a completely locked dictatorship. HomeKit is there to be licensed to other companies, and while getting certified is an expensive and very drawn-out process, the promised result – namely everything in your house understanding everything else, all easily controllable from your iPhone or Apple Watch – is beguiling.

You can, for example, set up chains of commands so that you just say “goodnight” and your HomeKit-enabled lights will turn off, except the light in the hallway, which dims down to a soft red for dark-accustomed eyes as you stumble to the toilet at 3am. That same command could also turn off anything connected to two specific HomeKit-enabled power sockets, but not three others.

HomeKit works because Apple has a list of types of accessories that it supports, and it standardises the data they report. That means you can control one manufacturer’s kit from another’s app (if the developer permits it). HomeKit is crying out for an official control app on iOS.

Still, once you’ve gone through the process, there really is something magical about raising your wrist, issuing a command, and having your home respond. Wondering

WITHINGS HOME

This home-monitoring camera instantly wins points because it doesn't reek of tech. The soft styling and bamboo sheath help it blend into the household's decor in the way that a traditional IP camera wouldn't.

It also won me over with high-quality video. For years we've had IP cameras that either tote 640 x 480 sensors, or have higher-res sensors that only use a fraction of that resolution at a time, reserving the rest for semi-fake zooming and panning. This punts impressive, high-frame-rate and high-definition video to your iPhone (a beta version is available for Android 4.4 or later) – not just when you're connected to your home network, but when you're out and about too.

The low-distortion 135-degree view means you don't always have to pan, but it's a 5-megapixel sensor so there's still headroom for zooming. Even when you crop to the maximum amount, the image, though soft, is still useful. The night mode is also superb. In short, I'm utterly blown away by the quality of the video.

You get audio as well as video, and can push-to-talk from your iPhone to remonstrate with unruly children or spouses. And, of course, you can get notifications – of motion, noise and high levels of volatile organic compounds, the latter of which lets you know you should open a window when you're cleaning, say. You can also get a visible warning of this poor air quality with the whole of the base of the unit softly glowing red as an alert.

There's an app for the Apple TV and Watch. The latter lets you toggle notifications or discreetly check whether your husband gave the kids dinner like he said he would, the lazy sod. You can see the scene live, or review the "journal" (also on iPhone), which shows thumbnails for every event – motion, noise detection – the camera has witnessed. It also builds 24-hour time lapses of your home, which can be exported.

Furthermore, there are optional subscription packages that give you seven- and 30-day cloud video storage.



KEY SPECS

\$300 • www.withings.com

OVERALL



ELGATO EVE DOOR & WINDOW



This is, in principle, one of the most basic things you could add to your home to give it some brains: a binary sensor that reports whether the two small units – one about the size of a slightly flattened sugar cube, one about the size of two stacked disposable lighters – are in close proximity or not. You attach one to a door or window and the other to the frame by peeling the backing off a strip of adhesive.

The point is that you can then load up the Elgato Eve app and check if the door or window to which you've attached the sensor is open. That's great when you're lying awake at night fretting that you forgot to close the kitchen window before you came to bed.

That said, the whole rigmarole of unlocking your phone, opening an app and scrolling to the right thing is so 2014. Instead, I could raise my wrist and without clicking or tapping anything simply say "hey Siri, is the kitchen window closed?" and lo, after a couple of seconds where my Watch displays "okay, asking around", I get the answer "it's closed" and then turn over and sleep the sleep of the just.

Setup is easy – with notable caveats

about the complexity of HomeKit – and the battery should last for about three months, because it uses Bluetooth Low Energy. That's reasonable, but note that it's an ER14250 lithium battery here, and it's not an especially cheap thing to replace. We're talking a fiver for one on Amazon, although you can reduce the per-unit cost by buying multipacks.

That brings us to the cost of the Elgato Eve Door & Window itself. At around \$70, these are not unthinkingly cheap things. You'd probably only want to buy one initially, for the most important door or window, and then gradually add others once it's proved its worth. The system isn't cheap to buy or run, but when you don't want to leave the warm cocoon of your bed, but can't be completely sure you shut the backdoor, you might well pay any money.

KEY SPECS

\$70 • www.elgato.com

OVERALL



Are you **BATTLE-READY?**



OCZ SHIELDPLUS
WARRANTY

NO Shipping costs and **NO** hassle
with **ADVANCED** replacement.



Trion 100 Series
Entry-level Users

- ▶ Max Read: 550 MB/s
- ▶ Max Random Read: 90,000 IOPS
- ▶ Endurance: 27 GB/day
- ▶ 3 Years ShieldPlus Warranty



Vector 180 Series
Enthusiasts

- ▶ Max Read: 550 MB/s
- ▶ Max Random Read: 100,000 IOPS
- ▶ Endurance: 50 GB/day
- ▶ 5 Years ShieldPlus Warranty
- ▶ Cloning Software & 3.5" Desktop Adapter

OCZ's ShieldPlus Warranty available for all Trion 100, Vector 180, ARC100, Vertex 460A and AMD Radeon R7 drives.

IKEA WIRELESS CHARGING FURNITURE

Wireless charging is one of those ideas that's terrific in theory, but frequently disappointing in real life. Its name suggests blissful charging of your devices wherever you sit them down. In reality, you're stuck with a single place to charge, just like a plug or cable.

Ikea's genius here is not so much that it makes standalone Qi-compatible wireless charging pads - though it does, and that's perfectly fine - but that it has built them into furniture. This not only means that you can be encouraged to add more charging points throughout your house, but that they're built into electrical devices that do other things. If, like me, you find you never have enough plug sockets in your house, this is a great way of adding multiple charging points without taking up another plug.

For example, one of the devices we tested was the Riggad work lamp. With this, you get a smart, warm lamp that not only has a wireless charging pad on the base, but also a USB port for charging another device - three functions running off a single mains socket.

We also tested the Selje bedside table, Nordmärke pad and, since my wife and I have

iPhones that don't support wireless charging, the Vitahult charging case. Because my wife is often wrangling with our baby, and doesn't want to be fumbling around noisily with cables or docks for fear of waking her, being able to just set her iPhone down on a surface and have it start charging was truly welcome. You can even buy charging pads from Ikea to build into existing furniture yourself.

However, the Vitahult case was a bit of a disappointment. Ikea's commendable cheapness doesn't carry well to consumer technology. Instead, I quickly switched my wife to the Incipio Ghost Qi case for her iPhone 6, which not only allows it to charge, but also has its own 2,100mAh battery, so that even if she passes out from baby-related exhaustion before remembering to put her iPhone on a pad, it shouldn't be completely dead the next day.

KEY SPECS

Svarious • www.ikea.com.au

OVERALL



PHILIPS HUE GO

This multicoloured LED lamp can be powered using its internal rechargeable battery for around three hours, as well as letting you control both its colour and brightness from an app on your phone.

It can connect to the same bridge as the other Philips Hue lights (which I already have in my home), and you can also build it into Hue "recipes". For example, I have one called Night, which switches off the lightbulbs in my living room and turns the Go down

to a dim warm glow to act as a nightlight for my baby daughter.

The reason I love this so much is that you don't have to be invested in the Hue ecosystem. The Go can operate completely independently. You switch between preset scenes - dim, bright, a surprisingly realistic flickering flame, and a series of slowly and pleasingly shifting colours for different moods - using the button on the bottom, and you can have it cycle through its entire spectrum of colours with the same button to pick one you like. There's a bump on the base that means it can lie flat or be angled to cast its light on a wall and, like all Hue lights, it can also connect to an Ambilight-enabled TV to replicate the colours onscreen further out into the room, which is great fun.

This, therefore, might be the very first thing you buy when turning your home into a smart home - before, indeed, you even necessarily know you're embarking on such



a project. You could happily use it as a standalone for a long time before gradually and organically adding more and more smarts to your house.

My main criticism is that it must be charged by plugging in a cable. That's not onerous, of course, but it's more fiddly than it could be. I would rather see a wireless charging base such as on the forthcoming Elgato Avea Flare. It could also be better rated for water resistance, since it's a lovely way of adding some gentle, ambient lighting for a bath - whether I'm bathing the baby or determinedly trying to relax in the tub myself.

KEY SPECS

\$289 • www.meethue.com

OVERALL



BELKIN WEMO SWITCH

There are quite a few “smart” plugs around, but they tend to be built for US or EU plugs. The Belkin WeMo Switch is one of the few that supports the good old Aussie plug.

It's a simple thing. Plug the (pretty bulky) unit into the wall and then plug in whatever you want to control with it. Leave the actual wall socket switched on at all times, and you can start or stop the flow of electricity to the connected device, by either pressing the little button at the top of the WeMo or by using an app on your iPhone or Android device. You can even use an app on your Apple Watch. In this way, you could remotely switch on a connected heater to warm a room ahead of time.

The app can do more than act as a manual switch, though. You can set schedules so that it switches on or off at certain times of the day - or even at sunrise or sunset - or add a WeMo Motion so that you can have things trigger when it detects something moving in the room. It can also hook into IFTTT, meaning you can create simple or

complex rule systems that switch the plug on when certain conditions have then been met.

Ultimately, though, I personally didn't end up having much use for a device that turned things on and off remotely. Anything I might have wanted to control needs more than just the presence of electricity to do something useful - a washing machine doesn't just start running when you flick the power switch - and those things I would like to power on and off remotely (such as lights) can already be controlled by more sophisticated systems such as the Philips Hue. Plus, I usually have multiple devices running from one socket, and rarely want them all on or off.

Things might be different if it supported HomeKit, where a simple “goodnight”



command issued to Siri would power off the things you wanted powered off, but even if support is added to the WeMo line, it can't be added retrospectively to any kit you buy now.

KEY SPECS

\$69 · www.belkin.com/au

OVERALL



NEST THERMOSTAT

I've been living with the Nest Thermostat for 18 months. While you can order the hardware alone, unless you happen to be a trained electrician then I suggest you pay an electrician for installation. Within 30 minutes the Heat Link box was mounted next to my boiler and a stylish round thermostat attached to my wall.

The Nest Thermostat only controls the heating, so we kept our existing timer for the hot water. Other than that, though, it works beautifully. Each thermostat connects to mobile devices via your home Wi-Fi but, sensibly, the thermostat talks to the Heat Link box via mains wiring or a proprietary wireless connection so isn't dependent on your network.

Controlling the temperature via the thermostat is easy: twist the outer ring clockwise for hotter, anti-clockwise for cooler. The colour display shows the current and requested temperatures and whether my boiler is currently firing. The display also acts as a giant button. Pressing it shows additional controls, plus usage history, although I found these easier to manage via the iOS and Android apps (you can also use a PC's browser).

And remote control from a phone is just one of the Thermostat's talents. I didn't want the rigmarole of setting a weekly schedule

so adjusted the temperature ad hoc. Cleverly, it then automatically detected my daily and weekly patterns and created a schedule for me. This isn't perfect, but it's easy enough to make adjustments.

My favourite feature is Nest Thermostat's ability to learn how long it takes to heat my home. Before, I blindly put on the heating at 6.30am (ish) in the hope that it would reach 20°C by 7am, but now it works out exactly when to fire based on past performance and the local weather (all automatically downloaded).

The Auto-Away feature proved less successful. It's supposed to detect a lack of movement when no-one's at home and switch off the heating, but the thermostat can only monitor the area in which it is located. Sometimes this meant it switched on and off repeatedly, so I stopped bothering with it. That's one of the reasons why the updated Thermostat Generation 3 includes more position sensors.

Whilst it isn't perfect, I can say one thing: wouldn't go back to non-smart heating.

KEY SPECS

\$350 · www.nest.com

OVERALL



IN THE LABS

You won't find better reviews anywhere in Australia!

Redundant reputations

BEN MANSILL ON SHEDDING THE GHOSTS OF THE PAST

I find it particularly annoying when I talk to people who have firmly cemented their idea that a particular company, or its products, are bad because of how things were many years ago.

There are always two that come up, Dell, for being boring, and Norton, for being slow. While, yes, Dell still features good amounts of boring in its range – and that's by design of course, serving the corporate market as it does – the company has a stellar range of truly exciting products, and has for many years. The Dell XPS 13 is a perfect example. This thin, light and powerful Ultrabook is just plain sexy. Classy-sexy, too, unlike some brands I shan't name that think high-end means garish and with strobing cycling RGB lights everywhere. I thought the XPS 13 looked pretty nice in the pictures I first saw, but when you set eyes upon it in the flesh, oh wow. It's a stunner.

The specs match its looks, too. Last issue Peter Gutierrez reviewed the mid-range i5 version and loved it, and in this issue Sasha went to town with a deep two-page review of the highest spec model. Apart from a minor quibble with screen brightness control software, he declared it the best Ultrabook ever made, and it's of course, straight into the A-List.

But for Symantec, with its Norton range of security software, it's been a tougher battle to change minds. It's true that back in the early to mid 2000s Norton was bloatware. It visibly and annoyingly sucked system resources, ran treacle-slowly and was in your face far too often with alerts, reminders, and just general pop-up work- and play-interrupting irritants. Symantec was badly bruised at the time and effectively started from scratch again with its Norton products. By 2010 it was slick and quick, and also

happened to win many group tests. Well, it didn't win ours, this month, but that's not for any slowness. And yet, in some quarters, its reputation is that of a resource hog. Most curious of all is that those who are most vocal in their venom against are the hardest of hardcore geeks in tech forums. The sort that love to sound like an expert by slamming something, all based on 'facts' that haven't been true for many years.

WINDOWS PHONE

I found it particularly fascinating to read Jonathan's thoughts about Windows Phone (starting on page 42). Here's a platform that is also widely ridiculed, and again, largely because Microsoft's made such a mess of mobile in the past. But has the new platform redeemed the ghosts of the past? Yes, the OS has, but the ecosystem is still a huge issue. Read on!



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WHAT OUR A-LIST MEANS

Our A-List award is reserved for the best products in each category we review. With a winner and an alternative pick in each, that's 92 products you know are first class.

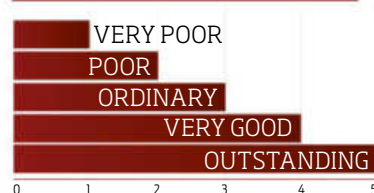


WHAT OUR AWARDS MEAN

PC & Tech Authority's comprehensive Real World testing sorts out the best products from the pack. Any product recommended by PC & Tech Authority is well above average for features, value for money and performance.



WHAT OUR RATINGS MEAN



HOW WE TEST

Our benchmarking tests are the best in the business. Read on to find how they work...

2D TESTS

Desktop PCs and laptops are tested using our own custom bench testing suite, which has been carefully designed to test all aspects of a system and rate them in a way that's useful to you.

Our benchmarking cover three main tests: a typical video editing test, a demanding 4K video editing test and a multitasking test that stresses all aspects of the system.

We look at the time it takes for each test to run, which is then compared to our reference PC to produce a normalised result. This score is shown on a graph, and to help you understand just where the PC we're reviewing sits in the grand scheme of things, we will often include other system's scores.

The median score of 100 is based on our reference system:

PC & TA REFERENCE PC. SCORE: 100

Intel Core i5-4670K CPU; 8GB of DDR3 RAM;
AMD Radeon R7 260X graphics card

On occasion we will run publically available bench testing software, predominantly PCMark 8 from Futuremark. This is run in the Home setting, in Accelerated mode. You can get PCMark 8 as well as 3DMark (below) from www.futuremark.com

3D TESTS

For video cards, as well as Integrated Graphics Processing Units, we use:

- 3DMark Firestrike
- Shadow of Mordor
- GRID Autosport

3DMark is designed specifically to test video cards, and you can download and run the same tool as us to help you gauge where your own GPU ranks compared to what we are reviewing.

The two games were selected because they are relatively well balanced in performance between AMD and Nvidia, favouring neither. Both feature a wide range of DirectX 11 shaders. GRID Autosport is fairly easy on GPUs, while Shadow of Mordor is quite demanding, so each provides a helpful gauge for you showing what to expect from a GPU in your favourite games. We will update these to cover DX12 once that API gains traction.

Tests are run using three resolution ranges, depending on where the GPU sits in the market:

Entry level: 1920 x 1080

Mid-range: 1920 x 1080 – 2560 x 1440

High-end: 2560 x 4K

BATTERY TESTS

Screen brightness is set to 120cd/m2, playing a 720p video on loop until the device runs out of power.

REVIEWS

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Apple iMac 21.5in (2015)

APPLE UPDATES ITS SMALLER-SIZED IMAC WITH AN OPTIONAL 4K SCREEN, BUT BEWARE THE ENTRY-LEVEL MODEL

The 27in iMac is too big, you don't want a MacBook and the Mac mini doesn't quite hit the spot. Well, Apple's baby iMac may be just the ticket, now featuring faster Intel chips and an optional 4K display.

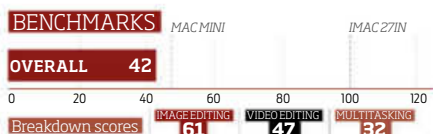
The base model provides a Full HD display, 1.6GHz Core i5 processor, 8GB of RAM and a bog-standard 1TB hard disk. Even with the updated Magic Keyboard and Magic Mouse, that's no bargain at \$1,699. You must bump up your budget to \$1,999 for the beefier 2.8GHz chip, while \$2,299 buys a 3.1GHz Core i5 processor and a Retina 4K display.

However, whichever of these variations you choose, the iMac has a positively prehistoric 1TB 5,400rpm HDD as standard. This is the first brand-new iMac I've used in many years that has felt sluggish straight out of the box. Spending an extra \$160 on the 1TB Fusion Drive upgrade will reap instant dividends. Also, note that the RAM is soldered onto the motherboard, so if there's the slightest chance that you might need 16GB, decide now (that'll be another \$320, by the way).

Visually, the iMac looks the same as ever: a very handsome all-in-one. Even if the screen's bezels are starting to look a bit on the chunky side, the design alchemy of metal, glass and tailored curves still looks great from any angle.

You may, however, be seeing more of the iMac's rear than you might wish. All the ports – four USB 3, two Thunderbolt 2, Gigabit Ethernet, SD slot and headphone jack – are located at the back. Still, the arrival of those superfast Thunderbolt 2 ports starts to make amends, while 802.11ac Wi-Fi and Bluetooth 4.1 more than cover things wirelessly.

If you're considering buying one of the cheaper 21.5in iMacs, don't look at Retina iMacs or MacBooks before spending your cash. So much as peek and the standard 21.5in iMac will look mediocre by comparison – all crude pixels and jagged, stair-stepped text.



That said, by the standards of Full HD displays, the iMac's 21.5in screen is really very good. The bright, high-contrast IPS panel does a great job with movies and photographs, and it's colour-accurate, too, so whatever's on screen looks exactly how it should.

The Retina 4K screen, though, is something special. Its 4,096 x 2,304 resolution serves up 14% more pixels than most 4K monitors, which means incredibly sharp images. I measured a Delta E of 1.1, 446cd/m² brightness and 86.5% coverage of the Adobe RGB with our X-Rite colorimeter – all fine scores. Thanks to consistent backlighting, it's actually a better all-round display than its 27in sibling: its backlight varies in intensity by as much as 15%, but the 21.5in iMac is much more even-handed, varying by no more than 7%.

Apple has also been playing with the iMac 21.5in's insides. Curiously, it hasn't opted for the latest Intel Skylake processors, but last year's Broadwell chips. Furthermore, the discrete Nvidia graphics chips that were used in the previous model have now disappeared – the new 21.5in iMac makes do with the integrated graphics chip on the Intel CPUs. Don't expect much. When I fired up the Unigine Heaven benchmark, at

Full HD and Medium detail, the entry-level iMac managed a juddery average of 12.8fps. Yes, the faster Intel CPUs on pricier models do have better GPUs – and hence more gaming power – but they're still not going to handle the latest titles.

Indeed, the entry-level iMac's 1.6GHz Core i5-5250U processor is more commonly found in laptops. It's fine for basic tasks – an overall score of 42 in our demanding benchmark suite proves as much – but if you need something that will fire through more heavyweight photo or video editing, then an upgrade to the 2.8GHz model will be very worthwhile.

As you may have deduced, I'm not a fan of the entry-level \$1,699 model. It doesn't deliver the slick, assured performance that I'd expect from a machine at the price. I'd opt for the top-end Retina 4K model. Adding a Fusion Drive ups the price to \$2,459, but it's a very capable all-in-one PC package.

Sasha Muller

KEY SPECS

\$1,699 • www.apple.com/au
Dual-core 1.6GHz Intel Core i5-5250U • Intel HD Graphics 6000 • 8GB RAM • 1TB 5,400rpm hard disk • 21.5in 1,920 x 1,080 IPS display • SDXC card slot • 4 x USB 3 • 2 x Thunderbolt 2 • Gigabit Ethernet • 802.11ac Wi-Fi • Bluetooth 4 • FaceTime HD camera • OS X El Capitan • 1yr RTB warranty • 528 x 175 x 450mm (WDH) • 5.7kg

OVERALL





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Dell XPS 13

FINALLY, IT'S THE WINDOWS
ULTRAPORTABLE WE'VE BEEN
WAITING FOR - THE DELL XPS 13
IS THE BEST ULTRABOOK YET

When spending a four-figure sum on a laptop, you want to feel like you're getting something special. You want a device that looks and feels like it's been exactly crafted – designed specifically to be the best in class. From the moment you lay hands on it, it's quite clear the updated XPS 13 is all those things.

Cool, gently curved slices of metal span the lid and underside, neatly sandwiching the soft-touch expanse of carbon fibre that pools around the backlit keyboard. The design of the XPS 13 is understated, modern and elegant.

It's solid, too, with not a hint of flex in its body, and it's surprisingly small for a 13.3in laptop. In fact, it's a touch more compact even than HP's 12.5in EliteBook Folio 1020, which is already pretty tiny as Ultrabooks go.

If you're hunting for the lightest ultraportable, though, this isn't it. At 1.2kg without a touchscreen, and 1.29kg with, the XPS 13 is heavier than the 12in Apple MacBook. However, those extra couple of hundred grams have been put to good use, and it knocks the MacBook flat in almost every other area.

Intel's Skylake processors are now in the driving seat, and bring with them the promise of longer battery life and much improved graphics performance. More exciting still, the SSDs on all but the cheapest XPS 13 now use the dramatically faster NVMe technology. This finally threatens Apple's fast flash storage for speed. One final magic touch: Thunderbolt 3 has arrived. Superfast connectivity is now just a USB Type-C cable away.

DISPLAY

Upfront, the XPS 13's display options remain as they were. You get the choice of a matte, anti-glare Full HD panel, or a high-DPI 3,200 x 1,800 touchscreen on the pricier models. Whichever takes your fancy, one thing remains constant: the display bezel is miniscule. It's enough to make other laptops look prehistoric.

I had the high-DPI model to play with, and it's gorgeous. Windows 10 does a far better job than Windows 8 of scaling the OS and applications sensibly across its 5.7 million pixels, and the result is that most apps look stunning. If this was the only display that you'd ever clapped eyes on, you wouldn't even know what a pixel was. Text is as crisp as you could ask for, and images look great thanks to the panel's stark contrast and wide colour palette. The XPS 13's display reproduces 95% of the sRGB colour gamut and racks up a contrast ratio of 1,052:1. Very respectable numbers.

If the uneven backlighting of the previous model was enough to make you angry, there's good news: Dell has improved the situation dramatically here. There is a faint halo around the screen's edges, but it's nowhere near as obvious as it was.

The only blot on the XPS 13's copybook is Dell's decision to retain the dynamic-contrast feature from last year's model. If you maximise an Explorer window against a dark desktop background, you can see the brightness dial slowly

BENCHMARKS

MICROSOFT
SURFACE PRO 4

OVERALL 46



upwards. Shrink the window back down again, and the intensity dims. Why is this worth moaning about? Well, when you want your display to remain bright – in harsh sunlight, say – then you can't take full advantage of the display's maximum brightness. With a full white screen, the display reaches an impressive brightness of 418cd/m². However, with 50% of the screen displaying black, and 50% white, the brightness dims to 242cd/m² – which is a very big drop.

I've been told Dell will eventually offer users a software tool to disable it, but frankly it shouldn't be activated in the first place.

PERFORMANCE

The XPS 13 feels like every high-end Windows device should – seriously quick. The combination of dual-core Skylake processors and high-speed NVMe SSD storage makes for a laptop that flies along in everyday use.

Take it to task with Photoshop CC and a huge pile of open Google Chrome tabs and it simply shrugs and gets on with it. The fans do spin up under heavy load, and the mid-toned whirr they emit is



✓ The 13.3in screen is wafer-thin, keeping overall thickness down



noticeable, but they're not half as whiny and annoying as on the previous model. That's thanks to the cooler-running Skylake chip.

In our suite of benchmarks, which includes 36-megapixel image editing and 4K video transcoding, the Core i7-6500U of our review model racked up very noteworthy scores. With an overall score of 46, it's 12% faster than the Broadwell Core i7 in the previous XPS 13, and about 5% quicker than the Skylake Core i5 in the Surface Pro 4, but 18% behind the Broadwell Core.

But it's the new NVMe SSD that has the most impact on how fast the XPS 13 feels. In raw benchmarks, it puts in the kind of numbers I've previously only seen from Apple's flash storage-equipped laptops. Read speeds top out at 1,390MB/sec, and while write speeds are a touch sluggish, maxing out at only 154MB/sec, those read speeds will have a far greater impact on day-to-day use. It boots up in a matter of seconds, and restarts in only a handful more. This is a quick SSD.

GAMING AND BATTERY LIFE

Skylake brings with it a dramatically improved GPU, and while it doesn't come anywhere near Nvidia's discrete chips for raw power, it's still a very welcome step forward from the Broadwell generation.

Let's get one thing straight, though: you won't be playing games at Full HD resolution nor anything approaching high detail settings unless, like me, your main gaming thrills consist of slow strategy titles such as Civilization V. That said, set your sights on 720p gaming with the detail settings dialled right back, and the XPS 13 will do its best to churn out playable frame rates.

I fired up my current go-to shooter, BioShock Infinite, and the Dell XPS 13 handled the action admirably. With the resolution set to 1,280 x 720 and detail settings dropped down to Low, I saw frame rates stay around the 30fps mark. In the in-game benchmark, the XPS 13 managed an average frame rate of 30.3fps, and that tallied well with my hands-on experiences. Gaming is firmly on the agenda, as long as you don't push the XPS 13 too hard.

You'd expect extra gaming power to come at the expense of battery life, but here there's a pleasant surprise. With the screen brightness dimmed down to 50%

and Wi-Fi off, the XPS 13 kept plugging away in our light-use test for 11hrs 31mins – which is 66 minutes longer than last year's model.

It didn't fare quite so well in our video-rundown test, initially lasting only 5hrs 38mins, but – after a bit of detective work – it transpired that one of Dell's preinstalled apps was causing unexpected spikes of CPU usage. After disabling the offending services, the XPS lasted for a respectable 7hrs 58mins.

KEYBOARD AND TOUCHPAD

I'm a fan of the keyboards on XPS laptops (barring the horrid XPS 11, anyway), and here the XPS 13 doesn't disappoint. The keyboard's backlight is adjustable through three brightness levels, and each and every key engages with a solid, muffled click that makes it easy to touch-type quickly and accurately.

The buttonless touchpad is similarly refined. It depresses with a solid-feeling click, and cursor control is pleasingly free of accidental hops and skips, and almost as nice to use as the touchpad on the MacBook Pro 13in. All I really missed in the transition was OS X's selection of multi-finger gestures and, naturally, the wonderful Force Touch.

That's no fault of the XPS 13, but I do wish the touchpad hardware on Windows devices was as tightly meshed with the operating system as it is on Apple's laptops. I use both OS X and Windows devices every day, and it makes a big difference.

CONNECTIVITY

One complaint levelled at the original XPS 13 was its limited connectivity. Luckily, that's no longer the case, especially now Thunderbolt 3 has been introduced, with USB Type-C replacing the mini-DisplayPort on the previous XPS 13.

For those of us with a healthy supply of mini-DisplayPort cables and adapters to hand, having to go out and buy all new

Thunderbolt 3 adapters will be a touch galling, but having a connector that can deliver 40Gbits/sec data transfers over Thunderbolt 3 – as well as compatibility with USB 3.1 and DisplayPort 1.2 devices – should make up for that.

Otherwise, there's little to report. There are two USB 3 ports – one on either side – a 3.5mm headset jack, a full-sized SD card reader, a standard miniature Dell AC power connector, and a Kensington lock slot. Whichever model you can afford, you'll get the same Dell 802.11ac and Bluetooth 4.1 wireless chipset.

Oh, and one final thumbs up: I love the battery indicator. Dab the little button on the XPS 13's left-hand edge, and five white LEDs light up to indicate the remaining battery level. Trust me, if you have a habit of wandering out of the office (or house) with a laptop that has almost zero battery life, then this is really a very handy feature.

VERDICT

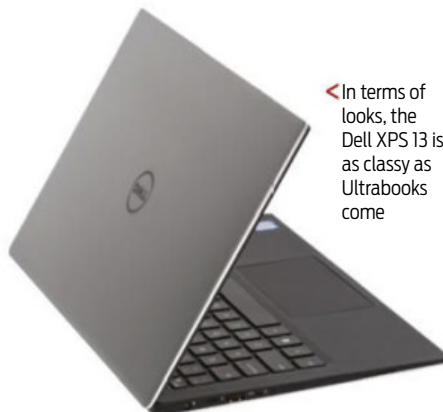
There's only one thing that really bugs me about the XPS 13, and that's Dell's stubborn insistence on enabling dynamic contrast at all times.

That aside, I absolutely love this thing. I could wish for a better GPU – yes, I really do want a slim, gorgeous ultraportable that also plays Grand Theft Auto V – but it will be a few years until ultraportables routinely come with decent gaming-class graphics. As it stands, this is a powerful, light, lovely ultraportable that comes a only hair's breadth from achieving perfection.

But which model should you buy? I'd ignore the lowest two tiers of the XPS 13 and skip straight to the \$2,499 Core i7 model with the high-DPI display and 256GB NVMe SSD.

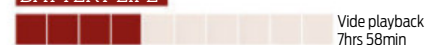
Because the Dell XPS 13 is sensibly priced I can see a lot of power-hungry users taking one look at this model and hitting the Buy Now button as fast as they can. Given the cash, I'd do exactly the same thing.

Sasha Muller



◀ In terms of looks, the Dell XPS 13 is as classy as Ultrabooks come

BATTERY LIFE



KEY SPECS

\$2,499 • www.dell.com/au
Dual-core 2.5GHz Intel Core i7-6500U • 8GB RAM • 256GB PCI-E SSD • 13.3in 3,200 x 1,800 IPS display • SD/SDHC/SDXC slot • 2 x USB 3 • Thunderbolt 3 • 720p webcam • 802.11ac Wi-Fi (2x2) • Bluetooth 4.1 • 52Wh Li-ion battery • Windows 10 Home • 1yr RTB warranty • 304 x 15 x 200mm (WDH) • 1.2kg

OVERALL



Acer Aspire R14 (2015) R5-471T-53MU

GOOD LOOKING, WELL BUILT AND VERY IMPRESSIVELY SPECCED FOR THE PRICE

The 2015 Acer Aspire R14 is a well-specced and decently attractive 'foldable' laptop – as in the screen can flip all the way around to operate in 'tent-mode' half-way rotated, or all the way for tablet mode. Acer has updated this year's model with a premium look – the black anodised metal case has a nice rubberish texture that's quite pleasing to the touch and aluminium accents along the case and trackpad edges do look very slick indeed.

Compared to the 2014 Aspire R14 it's a far better looking machine, but it's improvements inside that really lift it. Our test unit sported a dual-core Skylake-U Core i5-6200U CPU, which is a Skylake/6th-gen 2.3-2.8GHz CPU. It's paired with a Kingston M.2 SSD. A variety of RAM, storage and CPU options can be had so it's not difficult to spec it to your budget or needs.

Our review model was virtually identically equipped as HP's Spectre x360, with the same CPU, SSD capacity and RAM, yet is \$400 cheaper and has

a slightly larger screen (14in vs 13.3in). Lenovo's Yoga 3 Pro – another 'tent-mode' convertible, is \$200 more for the base model but only sports a 1.3GHz Core M CPU, though does have a far nicer 3200x1800 screen.

Properly next-gen tech includes the USB 3.1 port (though not Thunderbolt 3), and the use of MU-MIMO wireless technology in its 802.11ac Wi-Fi. The screen is average, at 1920x1080 and not notably crisp, but still decent for price and it is a touch screen.

It isn't an ideal tool for extended or regular typing. Key travel is short and the keys are smaller than they need to be, while there's plenty of empty space either side of the keyboard that could have been used for bigger and more spread out keys. It appears to be the same as last year's Aspire R14. The trackpad, while plastic, is accurate and responsive.

The Aspire R14 is excellent value with crisp performance. No important corners are cut in terms of the hardware and it's a decent looking machine, too. It's a little



thick and heavy compared with premium Ultrabooks, and the screen is average at best, but you'd be hard pressed to find a better value alternative that matches its specs and good looks.

Ben Mansill

KEY SPECS

\$1,599 • www.acer.com.au
i5-6200U • 8GB DDR3 RAM • 256GB SSD • 14in 1920x1080 touch screen • 802.11ac WiFi • SD card reader

OVERALL



Acer Chromebook R11

ACER'S CONVERTIBLE CHROMEBOOK SOLID BUT GIMMICKY
FEATURES WEIGH IT DOWN FROM BEING A TOP PICK

Acer has been a fervent supporter of Google's Chromebook initiative since it launched in 2011. Acer's latest Chromebook is the R11, an Intel-based 11.6in touchscreen laptop with a 360 degree hinge, running ChromeOS.

Specs wise it's near the top end for a Chromebook, with a quad core Intel Celeron N3150 CPU and joined by a handy 4GB of RAM instead of the usual 2GB. The 11.6in touch-screen display has a resolution of 1366x768, perfect for this sized screen and thanks to the 360 degree hinge, can be flipped around to be used as a tablet, or placed into tent mode as a stand for watching videos.

The usual gripe I have with cheap laptops is the use of eMMC storage, which is usually slow and ruins the entire experience. Fortunately, Acer has either picked a fast eMMC drive or ChromeOS is great at handling it, as with all my usage (dozens of tabs open in Chrome and Google Sheets), I didn't feel it chug or slow down. The other issue frequently

noticed with lower priced laptops is the use of poor quality displays with terrible viewing angles. Not so on the Chromebook R11. The display is glossy, but when viewing the display off-centre, the image still remains legible and basic colour accuracy is good, but not professional level (as you'd expect).

The keyboard is great to type on, but the trackpad is awful, with poor smoothness for two finger scrolling and the left and right click areas are not well defined. Acer claims 10 hours battery life and from my day to day use as a writing and research machine, 9-10 hours is what I achieved.

While the Chromebook R11 feels very solid and only weighs 1.25kg, the 360 degree hinge and touchscreen are gimmicks. If the price could have been reduced and the overall laptop made slightly lighter with a better trackpad, the Acer Chromebook R11 would be top of the list for any aspiring Chromebook user. The Acer C730 or the



Dell Chromebook 11 are probably better bets unless you really, really need the touchscreen.

Anthony Agius

KEY SPECS

\$449 • www.acer.com.au
Intel Celeron N3150 quad core CPU • 11.6in multi-touch display • 4GB DDR3L RAM • 16GB eMMC storage • SD card reader • 2x2 802.11ac • Bluetooth • 3-cell battery with 10 hours capacity • 720p HDR webcam • 1.25kg weight

OVERALL



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- ✓ Five Gigabit LAN ports with multiple subnets and 50,000 NAT sessions
- ✓ Two USB ports for 3G/4G USB modems, network printer, storage and USB thermometer
- ✓ Integrated IEEE 802.11ac wireless Access Point; dual band; up to 1300Mbps throughput
- ✓ VoIP (2 x FXS and 1 x FXO Line Port) for Vigor2925Vac



NBN Ready



UFB Ready

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VPN



Vigor2132ac

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- ✓ 2 x USB ports for USB printer, storage and USB thermometer

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Sony Catalyst Production Suite 2015.1

NOT THE COMPLETE PACKAGE, BUT TAILOR-MADE FOR THE LATEST SONY CINEMA CAMERAS AND SURPRISINGLY POWERFUL

The dominance of incumbent professional video-editing tools has led to one thing: feature creep, where the rush to stay ahead of rivals and force annual upgrades means software is weighed down with capabilities the average editor may never use. Sony's Catalyst Production Suite 2015.1 is different. Bundling together only the second iterations of Sony's Catalyst Prepare and Edit applications, its focus is on workflow.

Its arrival is timely. The DSLR revolution in video-making has sent shockwaves through the industry, with Canon's Cinema EOS cameras initially having the upper hand. But Sony's PXW-FS7 has now become the indie cinematographer's camera of choice. And, using XAVC Intra 4K footage, that's exactly what I tested Catalyst Prepare and Edit with.

Their interfaces have a modern feel, with large text, simple icons and minimal clutter, which makes them feel threadbare. That's fine, because both of the apps are focused on their roles. Prepare is aimed at footage organisation and primary colour correction, with only very rough editing facilities built in. Edit provides sophisticated tools for timeline editing, and can be used to produce a finished work.

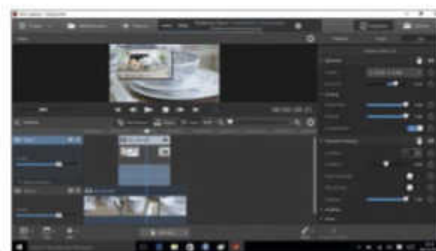
Catalyst Prepare lets you browse footage on your hard disk and the attached memory cards, and doesn't require this to be copied locally. Those limited editing facilities allow you to mark

in and out points, create subclips, and put together simple storyboard edits. The first of its two modes is Organize, which lets you copy your clips into bins and storyboards. You can copy clips to the standard library or a custom destination, either the whole clip or just between defined in and out points. It's also possible to batch export clips with transcoding. There are presets for the latter, from Avid DnxHD, OpenEXR and DPX to MP4, AVC, XAVC, XDCAM and SStP (Apple ProRes is supported, but only when running the Mac version of the software). You can even upload clips to the Sony Ci cloud collaboration service.

In its second mode, confusingly called Edit, Prepare lets you mark in and out points and then add to a storyboard, or copy a frame snapshot to the clipboard. Colour-adjustment tools are built in, and this is where the specific support for Sony video file formats comes into its own. The software will detect the colour space your clips were shot in, but you can change this if it's wrong.

There are scopes available, including waveform, histogram and vectorscope. Using these and the preview, colours can be adjusted for the source footage. You can adjust the exposure index, temperature and tint. It's possible to apply various look profiles, and adjust lift, gamma, gain and tone curves.

✓ Catalyst Prepare is for organising your clips, a bit of trimming, and initial grading



▲ Edit doesn't have as many features as the incumbent non-linear editors, but it does support OpenFX plugins

Once your clips are graded and arranged into a storyboard, it's time to switch to the Edit application. This is a standard timeline non-linear editor in layout, but it's powerful. You can add multiple tracks, for example, even if each new track is added beneath the others. Aside from video and audio layers, you can add titles, solid colours and colour gradients, but nothing as sophisticated as an adjustment layer.

Filters, generators and transitions include blurring, colourisation creative options, picture-in-picture, and Chroma Keying, but not Luma Keying. Edit also supports OpenFX plugins, which means that effects from NewBlueFX and HitFilm can be added, too. Most of the parameters can be animated over time. That said, it's highly significant that audio plugins, much loved by Sony Vegas users, are missing. So there's no equalisation, compression or gating. The multi-channel camcorder audio support is good.

When the edit is complete, it can be rendered out from the timeline in all the same formats as the transcoding function. It's also possible to export your projects in a variety of formats, including Premiere Pro, Final Cut Pro X, Avid Media Composer, and Sony Vegas Pro (EDL only). You also can opt to transcode footage for compatibility. I tried exporting to Premiere Pro with the original footage, and pulled it into the latest CC 2015 version of Premiere. It wasn't seamless, with the picture-in-picture effects missing, but it still preserved all the edit points and titles.

Sony Catalyst Studio 2015.1 won't take over your entire workflow, but its simplicity and stability give it a solid role at the start of the process. It doesn't feel like a finished product just yet, but there's a lot to like about how it is developing.

James Morris



KEY SPECS

US\$399 • www.sonycreativesoftware.com

OVERALL



Synology DiskStation DS716+

SYNOLOGY'S TOP END DUAL BAY NAS IS SMALL AND CAN DO IT ALL - FOR A PRICE

You might be thinking, "gee, \$700 for a two bay NAS? I can build a rather nice PC and chuck in my own drives for that sort of coin!", which would be a totally valid and reasonable response when looking at the price and specs of the DS716+. Let's look at what makes up the DS716+ and see if \$700 for a dual bay NAS is justified.

The DS716+ packs an Intel Celeron N3150 CPU and 2GB of RAM. This is a large factor as to why the DS716+ is pricier than most traditional NAS units, which use relatively underpowered ARM CPUs. Having such a powerful CPU means you're able to run things like Plex Media Server with no fuss – a task cheaper NAS units struggle with and something we discovered with the cheaper Synology DS416j reviewed in this issue on page 39.

There's a three-year warranty on the DS716+, unlike most other NAS units that come with a single year, or sometimes two. This is great not only for home users

wanting peace of mind, but for those using it in an enterprise environment who need to ensure there's support for this model for a little while.

Adding to the DS716+'s enterprise cred, is that it's listed by Microsoft, VMware and Citrix as tested and compatible with their virtualisation platforms. Perfect for use as a reliable and certified storage target for all your virtual machines.

Synology also mention that the DS716+ supports 4K transcoding. Whilst it has the ability for hardware transcoding, the only software package that takes advantage of it is the Synology Video app. If you wish to use Plex or another media centre app, it won't support the DS716+'s transcoding hardware. Keep this in mind if hardware transcoding is important to you. Note that due to the decent power in the N3150 CPU, 720p transcoding works relatively smoothly.

Is the DS716+ worth \$700? If you want a hassle free turnkey solution, yep,



the DS716+ is worth it. Synology's DSM software makes administering the NAS a breeze and the N3150 CPU in the DS716+ gives it a performance boost over most other dual bay NAS units.

Anthony Agius

KEY SPECS

\$699 • www.synology.com

Intel Celeron N3150 CPU • 2GB RAM, 2x 3.5in/2.5in SATA-III HDD bays • 2x Gigabit Ethernet ports • 3x USB 3.0 ports • 1x eSATA port • 3-year warranty

OVERALL



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Google Pixel C

A SUPERB PACKAGE THAT NAILS THE HYBRID DESIGN, EVEN IF ANDROID'S FOIBLES MEAN IT ISN'T PERFECT

Move aside Microsoft: it's taken Google to perfect the detachable hybrid design. The Pixel C, an Android tablet with a detachable keyboard, has trumped the Surface Pro 4 and iPad Pro. It's the best detachable hybrid design yet, blasting past its rivals in a cloud of dust and smoke.

It's down to the design details, specifically the way in which the two parts attach to each other. Take the tablet part in one hand and the keyboard base in the other, then overlap them along the top edge of the keyboard. One infeasibly strong magnetic "snick" later, and you have a perfectly usable ultraportable laptop with a hinge that can be adjusted to any angle. The keyboard isn't perfect, but the keys have a remarkable amount of travel and are well separated.

DESIGN AND DISPLAY

Keyboard aside, the Pixel C is a triumph of design. Its metal-clad, cool-to-the-touch chassis is as classy as it gets. As with the Pixel team's fabulous Chromebooks, it has the segmented LED light bar on the rear. When you're using the tablet, it lights up in Google's trademark rainbow colours, which identifies the Pixel C clearly as a Pixel product. In standby, the bar indicates battery status. Simply double-tap the back of the tablet and it gradually fills up, turning different colours for different levels of charge. It's little touches such as these that lift the Pixel C above the average.

Without the bar, there's little to distinguish Google's flagship tablet from its rivals. It's roughly the same shape and

size as an iPad Air 2 – the 10.2in display has an aspect ratio of 3:2, is finished in smart-but-familiar matte, sparkly silver, and the overall design is studiously minimalist. You won't find multiple ports and sockets scattered around the edges of this device, just a single USB Type-C port, used for charging and attaching peripherals, a 3.5mm headphone jack, a volume rocker and a power button.

The quality of the Pixel C's screen is beyond reproach. Google employs an IPS panel, just like Apple's iPads, and it's almost flawless. The brightness peaks at 450cd/m², the contrast level of 1,550:1 ensures that images and graphics leap from the screen, and the panel covers an impressive 97.3% of the sRGB colour spectrum.

SPEED AND BATTERY LIFE

The same goes for performance. The Pixel C is responsive, launches apps and games quickly, doesn't slow down when you're downloading and installing software, and doesn't overheat when you disconnect the keyboard for gaming.

I experienced a few initial problems with the touchscreen – scrolling up and down web pages was frustratingly jerky – but this ironed itself out after a day or so. Aside from that initial quirk, the performance is fabulous. The tablet is powered by Nvidia's latest Tegra X1 processor, which comprises a pair of quad-core 64-bit CPUs. Just like Qualcomm's top-end mobile chips, these two CPUs take on different types of tasks depending on the requirements – the consequence being greater power

efficiency and battery life, combined with speed when you need it.

Happily, the Tegra X1 proved that it has a light touch with undemanding tasks. It will easily last a full day of work. In testing, it delivered equally superb results. In our video-rundown tests, where we set the brightness of the screen to a standard 170cd/m², put the tablet into Flight mode for the duration of the test, and play a video full-screen until the battery dies, the Pixel C lasted for 14hrs 33mins. That outstrips every current-generation iPad by a distance.

THE ANDROID CONUNDRUM

There is one area where Apple wins by a mile, though. It began paving the way for a larger-screened work-driven iPad months before the Pro appeared, implementing a series of tweaks to give iOS 9 a modicum of multitasking.

Google did the same at its I/O developer conference at around the same time, promising a split-screen mode native to Android 6 Marshmallow. Critically, it hasn't delivered it just yet. The Pixel C still only allows you to run one app at a time, and it's this more than anything else that limits it as a work device.

Apps are another problem for the Google Pixel C's ambitions. Although there's a decent selection of serious apps available on Google Play these days – Google's Drive apps work well, as do Microsoft's free Office apps – there remains a swathe of Android apps that aren't optimised for use on larger-screened tablets.

VERDICT

The Google Pixel C is a fine tablet that nails the detachable hybrid design. It's fast and the screen is exceptional. What holds it back isn't value for money, but Android itself. Google's OS works beautifully on phones but remains an awkward partner for tablets. Until it resolves that, tablets such as the Pixel C – fabulous though the hardware may be – will remain luxuries rather than must-haves.

Jonathan Bray

BATTERY LIFE



KEY SPECS

US\$699 (32GB); US\$829 (64GB) · store.google.com
Octa-core Nvidia Tegra X1 CPU | Maxwell GPU · 3GB RAM · 32/64GB storage · 10.2in 2,560 x 1,800 IPS display · 8MP/2MP rear/front cameras · USB Type-C port · 802.11ac Wi-Fi · Bluetooth 4.1 · 6,840mAh battery · Android 6 · 1yr RTB warranty · 242 x 7 x 179mm (WDH) | 517g

OVERALL





✓ Intel NUC (Next Unit of Computing) machines have evolved into remarkably good value systems with good performance

Intel NUC5PGYH NUC PC

INTEL'S FIRST PLUG AND PLAY NUC

Intel's original Next Unit of Computing, or NUC for short, was released back in early 2013, and since then we've seen six different generations roll out. Each was powered by a different Intel CPU architecture, but they all had one annoying similarity – a lack of components. While other vendors of copycat small form factor PCs sold models that were ready to use straight out of the box, Intel deliberately left out system memory, a hard drive and an Operating System.

While the logic of this makes perfect sense, allowing buyers to select the relevant components for their needs and budget, it's nice to see that Intel has finally released a fully constructed NUC in the NUC5PGYH model. Even better, the inclusion of all the necessary bits and bobs hasn't come at a shockingly high price as a compromise.

The external case of this unit is basically identical to the last generation, comprised of both aluminium and plastic, and measuring just 115mm x 111mm x 51.6mm. The included VESA mount means it'll easily tuck away behind suitable display panels, yet despite its small size there's a healthy range of connections. On the front are twin USB 3.0 Type-A ports, an Infra-Red sensor for use with a remote or IR keyboard and mouse, along with a single 3.5mm stereo mini-jack for headphones or microphones. Heading to the rear reveals two more USB 3.0 ports, but only one of the rear is capable of charging devices. Both HDMI 1.4b and VGA outputs deliver two options for video output, while another 3.5mm audio mini-jack doubles up as a S/PDIF output if you need to use optical out. Networking is delivered courtesy of the single Gigabit Ethernet

port on the rear, along with Intel's excellent Dual Band Wireless-AC 3165 802.11ac adaptor included within, which also supports the latest Bluetooth 4.2 standard. The last input on the back is for the power, and we were pleasantly surprised at how tiny the external power pack is, around the same size as most phone chargers. On the left side of the chassis is a single SDXC card slot, which is rated to handle UHS-I speed cards.

This card slot will come in mighty handy, as the only storage included is a 32GB eMMC onboard drive, which is basically an SD card mounted directly on

"A palm-sized PC with brisk performance, including Windows 10, for just \$369 is a steal."

the motherboard. Accordingly, it's not in the same league of performance as a true SSD, which has a dedicated controller and more banks of memory to speed up performance, but an eMMC drive still runs rings around mechanical drives. We found desktop performance to be extremely snappy, despite the relatively ho-hum components within. There's room inside for a true SSD thanks to the 2.5" inch drive bay, which can handle anything up to 9.5mm in depth.

Considering the brisk performance, we were very surprised to see just 2GB of DDR3 1600 memory is included, likely a result of the pre-installed Windows 10 having a minimal memory footprint. At the core of the NUC is the Intel Braswell Pentium N3700. With a remarkable TDP of just 6W, this quad-cored CPU ramps up to 2.4GHz when necessary. Despite the

low thermal output, it's actively cooled but even under load is extremely hard to hear the cooling.

Setting up the NUC couldn't be easier – simply jack in the display, keyboard and mouse and you're good to go. Windows 10 has been preinstalled, and we had the system up and running in just 10 minutes. However, our pre-production sample had a weird quirk that meant we were unable to install PCmark 8, which would close with a fatal error half way through installation. We are confident that final retail models won't exhibit this behaviour. Despite being unable to run benchmarks, we were very impressed with desktop performance, with apps opening quickly and being very responsive even with several open. The integrated Intel HD Graphics easily handled 4K video playback, though gaming is out of reach for its meagre 16 execution units running at 700MHz (in comparison Intel's HD Graphics 520 has 24 execution units running at 1.05GHz).

Despite our issues with the hard drive, we were taken with Intel's fully-fleshed out NUC. Being able to buy a palm-sized PC with brisk performance, including Windows 10, for just \$369 is an absolute steal, and its feature-set means it's just as good as a simple office PC as it is a media player.

Bennett Ring

KEY SPECS

\$369 • www.intel.com.au

Intel Braswell Pentium N3700 (quad-cores, 2.4GHz under load) • 2GB DDR3 1600 • 32GB eMMC drive • Intel 802.11ac Wi-Fi and Realtek Gigabit Ethernet • 4 x USB 3.0

OVERALL



Windows 10 Mobile

NOT YET THE GAME-CHANGER MICROSOFT PROMISED, BUT IT LAYS THE FOUNDATIONS FOR A POTENTIALLY GREAT FUTURE

When we're all fondly reminiscing about OSes in a decade or so, there's every chance it will be Windows 10 Mobile, rather than its big brother, that's seen as the pivotal release of 2015. The introduction of Universal apps, which run the same code on phone and desktop, is something that's never been attempted before in the mobile space, and it could eventually turn the phone world on its head.

At first glance, however, you'd be forgiven for wondering what all the fuss is about. The lockscreen and homescreen look largely as they did in Windows Phone 8.1, with vertically scrolling, data-rich Live Tiles still the dominant feature.

But it doesn't take much digging before the changes begin to emerge. The most obvious are to be found in the Action Center notifications menu. The first time you look, you'll see the same four toggle buttons along the top of the menu, with notifications lined up beneath. Look closer, though, and you'll see a number of subtle changes.

ALL CHANGE

For a start, the "All settings" shortcut has disappeared, to be replaced by Expand. Tap this and the single row of shortcut buttons expands to four, allowing quick access to all 16 of Windows 10's available shortcuts. It's still possible to customise the four that appear by default, but you can't add or remove items from the expanded list.

Notifications have also received an upgrade. To the right of each notification now sits a small down arrow, which, if tapped, expands items, allowing you to either read more or interact with them. The current range of apps that hook into this capability is limited: you can respond directly to text messages, but not emails or Slack messages.

Tuck the notifications menu away and you may also notice a tweak or two to the look of the homescreen. Background wallpapers, which were previously displayed rather oddly through the tiles – as if they were windows into an image behind – now fill the entire screen behind the tiles for a much more modern look. And certain tiles, such as those for Outlook and Microsoft Edge, are now translucent, showing up like squares of frosted glass.

There are new tile sizes to play around with too: a huge 4 x 4 square tile, and a

tall thin, 2 x 4 rectangular tile – but not all apps are compatible with these sizes.

Swipe right to Windows Phone's alphabetical list of apps, meanwhile, and you'll see another of the changes, with a list of recently installed apps conveniently displayed in a group at the top of the list for easy access, and a search field permanently displayed at the top.

UNIVERSAL WINDOWS

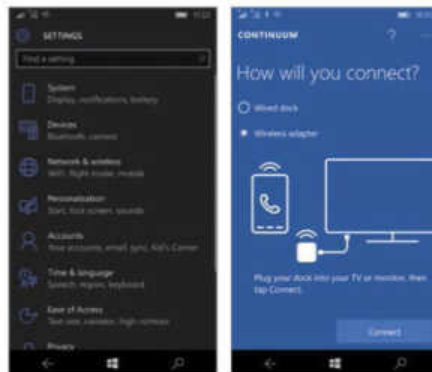
With Microsoft merging the names of the desktop and mobile operating systems, the aim is to unify the two platforms so there's consistency across them. That has benefits for some users, with the familiar look and feel making the transition from desktop to mobile easier than with other platforms. So the argument goes, at least.

But Microsoft's ambitions reach even further and deeper than this. It wants developers to produce "Universal apps" that share the same UI and feature set across the two platforms. There aren't many of these third-party apps available just yet, but as you navigate the OS, you'll pick up hints and echoes of Windows 10 everywhere you look.

There's the homescreen, which reflects the style of the desktop Start menu. The notifications menu is in the same style, too. More significantly, this synchronises with desktop Windows, so when you dismiss a notification on your phone, it also disappears from your laptop. Neat.

The Settings menu is identical across desktop and mobile (at least on the surface), with each entry now accompanied by a wireframe icon and fonts that match those used in Windows 10 on the desktop. Again, however, the changes are more than skin-deep.

✓ Continuum allows you to hook up your phone to any TV or monitor



▲ Wallpapers now fill the screen behind the tiles for a more modern look

Microsoft has also rationalised and organised the list of items in the Settings menu and – at long last – has finally added a search field.

Consequently, it's now easier to find important settings and features on your Windows phone, but you'll still be left scratching your head about some of Microsoft's decisions. Why on earth are the Glance Screen settings under Extras, and not Display?

For that matter, why are the lockscreen settings under Personalisation? It's baffling, to say the least.

CORE APPS

The redesign of the core apps is the key indicator of how Windows 10 Mobile is unifying desktop and mobile. All of the core apps – from Office to the Microsoft Edge browser, Calendar, Mail and so on – share the layout and UI of the equivalent app on Windows 10 for desktop. And, by and large, they all work pretty well. I'm not a big fan of the menu that pops up from the bottom of the screen and replicates the desktop ribbon interface, but this is no deal-breaker.

Cortana shares the desktop app's look and feel, as well as its extended functions – such as the ability to send texts and emails by voice. However, Cortana is infuriatingly inconsistent in its voice-recognition accuracy and nowhere near as competent as Google Now.

CONTINUUM MADE REAL

Another unique feature of Windows 10 Mobile – and some would say its best – is Continuum. Plug a video adapter into the Lumia 950's USB Type-C port and you can hook up the phone to any monitor or TV and use it like a desktop PC.

All you need to add is a Bluetooth keyboard. A mouse isn't strictly required, since the screen of your phone transforms into a multitouch trackpad – and a rather effective one at that. However, for the full desktop experience, it's advisable to go ahead and get one.

Unfortunately, Microsoft couldn't provide the Display Dock for our testing. This is equipped with three USB ports, plus DisplayPort and HDMI video outputs, and a USB Type-C port for power supply. Ironically, I was able to get it to work with an Apple USB Type-C to VGA adapter. But this operates at a rather coarse resolution – you need a HDMI or DisplayPort adapter to run at full 1080p.

Furthermore, it's worth noting that Continuum works with Miracast-compatible screens and adapters, although when I tried this out with an official Microsoft dongle, it was horribly slow and laggy. I would advise sticking

“Microsoft has rationalised and organised the list of items in the Settings menu and – at long last – added a search field”

with a wired connection if you plan on using the feature regularly.

What can you actually do with your phone in Continuum mode? Strangely, not an awful lot. You can't run full Windows desktop apps on the screen of your monitor, and nor can you run Windows Phone 8.1 apps, although

these will run on the screen of the phone while your pseudo-desktop runs on your monitor or TV.

The only apps that work, in fact, are Universal apps, and there aren't too many of those around at the moment: only the core Microsoft productivity apps – Mail, Word, Excel and PowerPoint – along with Microsoft's Edge, Maps, Films and TV and so on. Oh, and a handful of third-party apps. The Audible and Guardian apps work, but not a lot else.

However, for the apps that are available, the system works well. There's a file explorer app that lets you browse files in local storage, as well as drives that are attached externally via the Display Dock. It's easy to get to grips with because the desktop is laid out in a familiar fashion to Windows 10 proper, with the Start menu in the bottom-left corner, notifications in the bottom-right corner and taskbar running along the bottom of the screen. That said, you can't

Microsoft Lumia 950

IF YOU'VE BEEN STUCK WITH A WINDOWS PHONE, THERE'S PLENTY TO LOVE, BUT ANDROID OR IOS SWITCHERS WILL BE DISAPPOINTED

Mobile OSes are only as good as the phone they're paired with, so I expected Microsoft to pull out all the stops with the Lumia 950.

Certainly, the specs list is like a who's who of flagship phone internals, from the hexa-core Snapdragon 808 chip to the 5.2in Quad HD display. It's practical too: Gorilla Glass 3 protects that display, while a removable battery and wireless charging are always welcome. There's no fingerprint reader, but the iris recognition is an interesting alternative – and it works.

However, the specs are also a little misleading. I expected animations to be as smooth as melting butter on a Teflon frying pan, but not so: shifting from the homescreen to the alphabetised list, for example, was often met by a judder. Nor does battery life excel. In our video-rundown test, with the phone in Flight mode and the screen set to a brightness of 170cd/m², it lasted 10hrs 1min. Not a disaster, but below average.

If you like your phones glamorous and glitzy, look away. The Lumia 950 is plain and featureless, and the rear

is made from thin plastic that sounds worryingly hollow when you tap it. The metallic trim surrounding the camera lens only catches the eye because the matte-grey case is so dull.

Things improve slightly with the display. It's an AMOLED panel and as sharp as you like, delivering a pixel density of 564ppi. Microsoft has also managed to keep a lid on AMOLED's tendency to run riot with colour, meaning that photos look realistic without being completely over the top. The problem is that it isn't very bright, reaching a maximum of a mere 297cd/m². This doesn't bode well for readability under a blazing sun.

On the other hand, the Lumia 950's camera is unequivocally great. It takes reliable photographs no matter what the conditions, because Microsoft has taken care to get the fundamentals right.

The resolution is high at 20 megapixels; there's optical image stabilisation; the aperture is a bright f/1.9, so plenty of light reaches the sensor; and – most important of all – the sensor itself is a comparatively large 1/2.4in. Even in poor light, the Lumia 950 captured clean,

detailed images. When it's too dark for flashless photography, the powerful, triple-LED flash can be used.

What's more, Microsoft has retained the excellent camera interface of previous Lumia phones, which delivers quick access to critical adjustments.

The tweaks are more limited in video mode – there's no way to lock off exposure or adjust ISO sensitivity for instance – but you can shoot in resolutions of up to 4K at 30fps, and quality is excellent, even in poor light. The digital optical stabilisation worked well too.

Should you buy it? Those switching from Android or iOS are likely to be disappointed for the reasons I go into in the main Windows 10 Mobile review. For Windows Phone users, though, it will feel like manna from heaven.

Jonathan Bray



KEY SPECS

\$999 • www.microsoftstore.com.au

Hexa-core 1.8GHz Qualcomm Snapdragon 808 CPU • Adreno 418 GPU • 3GB RAM • 32GB storage • 5.2in 2,560 x 1,440 AMOLED display • microSD slot • 20MP/5MP rear/front cameras • 802.11ac Wi-Fi • 4G • Bluetooth 4.1 LE • 3,000mAh battery • Windows 10 Mobile 1yr RTB warranty • 77.2 x 9.4 x 147mm (WDH) 1150g

OVERALL



Microsoft Lumia 950 XL

A FAST PROCESSOR AND LARGE DISPLAY PUSH THE 950 XL INTO PREMIUM TERRITORY, BUT THE PRICE IS TOO HIGH

If Microsoft is going to succeed with Windows 10 Mobile, it needs to win over those on Android or iOS. I fall decisively into this camp, so PC & Tech Authority's reviews editor asked: could it woo me?

It made a great first impression. Although the fashion has moved away from plastic-backed handsets such as this one towards metal, it feels reassuringly solid and the gently rounded edges add finesse. Besides, that plastic back can be removed to reveal the replaceable battery and microSD slot.

I'm also pleased to see a USB Type-C connector to replace micro-USB, especially as Microsoft helpfully provides both a USB lead and a plug charger. It also supports wireless charging.

It took me a little longer to get used to the phone's sheer size. The 5.7in screen results in a bigger body than you might expect. In return, though, there's a lovely screen. It's the same resolution as the Lumia 950, so has a slightly lower pixel density of 518ppi, but it's still incredibly sharp. The 950 XL actually goes a

touch brighter than its smaller sibling, but it's far from searing, with our tests registering only 305cd/m² at maximum brightness.

I found the 3,340mAh battery comfortably saw me through the day, but the biggest difference compared to the 950 is speed: two more cores and a 200MHz clock boost eliminated judder. The difference was even more striking in GFXBench, with the Manhattan offscreen test almost doubling from the 950's 12.3fps to 21.2fps.

Their cameras are identical, so it's no surprise the 950 XL's results are similarly fantastic. Here, you also get a dedicated camera button, which can be used to launch the camera app from standby in a second.

It's interesting to see that Microsoft is supplying the Display Dock for free with the 950 XL when you buy from its online store before the end of January 2016. Add a keyboard (the phone transforms into a multi-touch trackpad), connect your monitor, and it feels like you're using a mini computer, complete with Word and Excel.



There's a lot I liked here, but I was left with the same concerns many have about apps. Yes, there's Twitter and WhatsApp and a multitude of others, but the Windows Store versions of apps often feel like developmental afterthoughts. Twitter is a throwback to the days before you could "heart" posts, only letting you "favourite" items. Furthermore, WhatsApp groups with multiple people aren't colour-coded per person as they are on Android.

To make the change would be a leap of faith, and I don't have it. Perhaps a lower price could have swayed me, but the Lumia 950 XL is one of the most expensive handsets on the market. For a few dollars less, I could buy a Nexus 6P. The Lumia 950 XL is a nice phone, but not persuasive enough.

Alan Martin

KEY SPECS

\$1129 • www.microsoftstore.com.au

Hexa-core 1.8GHz Qualcomm Snapdragon 808 CPU • Adreno 418 GPU • 3GB RAM • 32GB storage • 5.2in 2,560 x 1,440 AMOLED display • microSD slot • 20MP/5MP rear/front cameras • 802.11ac Wi-Fi • 4G • Bluetooth 4.1 LE • 3,000mAh battery • Windows 10 Mobile 1 yr RTB warranty • 77.2 x 9.4 x 147mm (WDH) 1150g

OVERALL



run apps in windows.

So does Continuum mean you're going to start carrying around just your phone instead of a laptop? I can't see that just yet. But Microsoft is at least trying to give you the option in certain circumstances.

THE APP GAP

This is all great, but no review of a new phone OS would be complete without considering apps. It's the elephant in the room for Windows 10 Mobile. No two ways about it, Microsoft's mobile platform suffers in comparison with iOS and Android when it comes to app availability.

Not, perhaps, for the major social networks, movie and music-streaming apps – most of those are present in the store. But, when it comes to apps for accessories such as, for example, smartwatches, fitness bands and smart-home appliances, the Microsoft ecosystem languishes in third place, and

a distant third at that.

This may change over time if the concept of Universal apps catches on. After all, there's still a huge installed base of Windows laptops and PCs out there, and the appeal of being able to develop one app for those and then have it work, just like that, across phones could eventually fill the gap.

That's very much for the future, though, and if you buy a phone running Windows 10 now, you're going to be missing out in some areas. If you think you don't care about that now, with the Internet of Things rapidly expanding and the phone becoming the common interface for smart technology everywhere, rest assured that you will do soon.

I've always had a soft spot for Windows Phone and, despite its numerous foibles, that fondness continues with Windows 10 Mobile. For instance, I like the simplicity of its interface. Moreover, what Microsoft has done in extending the look and feel of

the OS across both desktop and mobile here is a remarkable feat of UI design. Sure, there are some areas where it doesn't quite work, but largely Microsoft has pulled it off, and that should be applauded.

The question is: are the changes enough? In particular, will they be enough to encourage dyed-in-the-wool iOS and Android fans to make the switch? The answer to those questions is absolutely not. Windows 10 Mobile is too far behind and has too little market share – and therefore importance to developers – to turn that around any time soon.

However, for Windows 10 and Windows Phone 8.1 fans and those who are encouraged by Microsoft's ambitious new direction, there's just enough here to encourage them to hang on for one more generation. And, who knows, maybe after another two years, the picture may look rosier.

Jonathan Bray



Asus RT-AC5300

FIVE TIMES THE SPEED OF GIGABIT ETHERNET... OR NOT

Welcome to the fastest router that has passed through the PC and Tech Authority test labs. Asus' new router combines three different wireless networks into one device to provide oodles of bandwidth for users that need to connect a large number of devices. In fact, if you're not connecting more than ten devices to this beast, you're wasting its potential.

As with all routers, the claimed speed is a little confusing. This is rated to deliver 5300Mbps, but that's not delivered to one device. This number is created by combining the three different wireless networks pumped out by the RT-AC5300, which is why it's called a tri-band router. There's a single 2.4GHz network which delivers a theoretical maximum of 1000Mbps, along with twin 5GHz networks that both individually deliver a theoretical maximum of 2167Mbps. 2167 plus 2167 plus 1000 equals 5300, which is why Asus claims this as a 5334Mbps device. However, there's no device on the market that can join to three separate networks simultaneously, so the maximum speed you'll get on one device is 2167Mbps... but there's a catch to this as well. This device uses a 4x4 transmitter/receiver configuration, which means your receiving device must also be of the 4x4

configuration to receive the maximum theoretical throughput. However, most devices these days are just 1x1 or 2x2, which limits them to a mere quarter or half the potential speed. If you connect a 2x2 device to the 5GHz network on this router, you're going to be limited to just 1087Mbps. This lowers even more to 541Mbps on a standard 1x1 device, as found in laptops more than a couple of years old. There are a few 4x4 devices on the market, including Asus' own EA-AC87 media bridge, but they're definitely in the minority. Asus sent us the PCE-AC66 Wi-Fi PCIe networking card to help us test this router, but even this is limited to a 3x3 design.

Before we look at the performance, let's delve into the laundry list of features found on the RT-AC5300. The exterior case is rather large, at around 25cm by 25cm, and is dominated by eight huge antennae. Each can be individually positioned to improve signal strength depending on which areas of your home or office you want covered.

On the rear are four Gigabit Ethernet ports, along with a single WAN port and USB 3.0 port. Two Ethernet ports can be combined via Link Aggregation to deliver up to 2Gbps of bandwidth to suitable devices. Another USB 2.0 port is on the side, along with buttons for WPS, Wi-Fi and turning the LEDs on or off.

Inside we find Broadcom's BCM4366 silicon powering the three networks, along with 128MB of flash memory and 512MB of RAM. This router is MU-MIMO compatible, but at the time of writing this feature is temporarily disabled, with Asus explaining to us that there's an issue with the Qualcomm adaptor that is being resolved and a firmware update is in the works to enable MU-MIMO.

The router can also be set to prioritise game traffic, and also has access to the WFast Gamers Private Network, a service that ensures your packets reach international MMO servers in the least possible hops. AiRadar is Asus' name for the beamforming tech used on this router, which focuses the radio signal in the direction of your connected devices. Smart Connect automatically assigns the right network for each device, but this feature must also be compatible with connected devices, and many of today's Wi-Fi enabled gadgets sadly aren't. There's a stack of other features too long to list here – heading to the product's webpage at www.asus.com/au/Networking/RT-AC5300 will give you the full rundown.

Heading into the ASUSWRT user interface reveals that this thing is targeted at techies, with a plethora of configuration options just waiting to be toyed with. Thankfully the setup wizard makes initial installation a breeze, but there's plenty of scope to experiment in the more detailed options.

Using the 3x3 Network card supplied by Asus, we managed to record a speed of 789Mbps on the 5GHz network at a range of approximately ten metres, which is a huge step up from prior tests. However, and it's a big however, this is likely because this is the first time we've had a 3x3 device to receive the signal, so we can't compare it to previous tests.

There's no denying this is a powerful router, and at only \$70 more than the Asus RT-AC88U it offers double the amount of 5GHz bandwidth. If you're connecting less than ten devices to the twin 5GHz networks, this extra bandwidth isn't necessary, but there's no harm in future-proofing as more devices start including Wi-Fi.

Bennett Ring

KEY SPECS

\$439 • www.asus.com.au
Tri-band router (2 x 5GHz and 1 x 2.4GHz networks) •
802.11a/b/c/g/n/ac compatible • 4x4 antennae design;
Combined rate of 5334Mbps

OVERALL



Synology DS416j

SYNOLOGY'S BUDGET NAS GETS A SPEED BOOST

If you're familiar with Synology's DS414j, you'll know what to expect with its successor, the new DS416j. From the outside they both appear to be identical, as they share the exact same exterior shell. It's only when we take a look at the specs that are driving the new model that we see a slight improvement, but is it enough to justify the \$80 leap in price between the two?

This is a four-bay NAS unit that is slightly shorter yet taller than a shoebox, so will easily fit on a corner of your desk. It's quite the looker, but we're not big fans of the fact that the lid must be unscrewed to access the four drives within; we much prefer the ability to swap drives easily from the front of the unit, as seen on the DS413. Twin fans are mounted at the rear of the case to keep your data nice and cool, and we found them to be silent during our testing session.

The major difference between this and the DS414j is the improved CPU. The latest model has a Mindspeed

Comcerto 2000 dual core chip running at 1.2GHz, while its predecessor had a Marvell Armada 88F6828 dual core chip running at 1.3GHz. They both have an identical amount of memory, with 512GB of DDR3. The newer chip hasn't improved read speeds, with both posting a result of 112MB/sec, but it has helped out when it comes to writing. While the 414j measured around 74MB/sec, the newest model increases this by 37%, up to 101MB/sec.

And that's the only difference, apart from the ability to dim the LEDs on the front of the case. The same brilliant Synology operating system is employed, which enables a huge range of features – cloud access, remote camera operation, DLNA streaming and so much more. It's still not powerful enough to transcode Plex videos though, so if you're looking for a Plex transcoder you'll need to look elsewhere.

If you already own a DS414j, there probably isn't much point in upgrading to



the newer model. However, if this is going to be your first budget NAS, the slight price hike is worth considering if you think you're going to be doing a lot of writing to the NAS.

Bennett Ring

KEY SPECS

\$499 • www.synology.com

Mindspeed Comcerto 2000 dual core CPU at 1.2GHz • 512MB DDR3 memory • 1 x USB 2.0 and 1 x USB 3.0 port • 4 x 3.5in or 2.5in drive bays.

OVERALL



Corsair H5 SF low-profile CPU cooler

WATER COOLING FOR YOUR SFF PC

Mini-PCs are booming, as evidenced by the huge range of Mini-ITX motherboards on the market. They're even good enough for gaming now, with cards like AMD's Fury Nano delivering desktop performance in a potent little package. Unfortunately their lack of space for a cooler means overclocking in an SFF PC has been a tricky proposition... until now. Corsair's new H5 SF is an All-in-One liquid cooler delivers a huge increase in cooling

performance, but it comes with a few caveats.

As you can see, this thing is still rather large. The small radiator (167mm x 40mm x 57mm) is fitted to a huge 120mm blower fan (120mm x 32mm), while Corsair's standard water block design attaches to the CPU. The entire unit sits on a bracket that mounts to a standard Mini-ITX motherboard, raising it several centimetres above the board. Installation is up to Corsair's usual standards, with excellent instructions and one of the best CPU socket mounts in the industry.

Compared to a standard low-profile HTPC cooler, we saw a huge 12C decrease in load temps on our overclocked i7-6700K at 4.5GHz. Noctua's LN9i peaked at 78C while running 3DMark, whereas the Corsair cooler clocked in at just 66C. However, this comes at a price – fan noise. We measured a fan noise of

46dB, a huge increase over the Noctua. With many mini-PCs serving double duty as both gaming and media PCs, this fan noise is a real problem during media use. Even at the slowest fan speeds it's

noticeable, a result of the blower style cooling fan. There's also the shape of this thing – you're unlikely to find many mini-PC cases that won't need some form of modification to make this thing fit, as many have 3.5" drive bays that will sit right where this cooler needs to be.

We certainly appreciate the cooling prowess of the H5 SF, but the issue of fan noise is a big one. Combine this with the need to modify your case to make it fit, and the H5 SF becomes a rather niche item for those building heavily modded, high-performance mini-PCs. For most users, sticking with a low-profile cooler and a non-overclocked CPU will offer the preferred experience.

Bennett Ring

KEY SPECS

\$125 • www.corsair.com

Mini-ITX compatible • 1000-1800RPM fan speed • 120mm fan • Total height of 84mm when mounted.

OVERALL



Acer Predator XB1 XB271HU

STANDARD RESOLUTION BUT WITH 165HZ G-SYNCHED SMOOTHNESS...

G-Sync, Nvidia's proprietary frame-smoothing technology, is possibly one of the most exciting game developments in the last five years. Being a hardware solution – as opposed to AMD's similar, but software-based, FreeSync – it does add a bit to the price of a monitor, but when you combine that with everything else that Acer's new Predator-branded monitor is offering, you end up with one compelling piece of hardware.

The XB1 is a 27in model, with a crisp IPS panel boasting Ultra Low Motion Blur, a 144Hz refresh rate (and this can be 'overclocked' to 165Hz), 100 per cent sRGB coverage. Basically, it's a sexy piece of kit, and we suspect it's the same panel as used in Asus' similarly specced Asus PG279Q, though we couldn't confirm that for certain. In actual use it delivers on every promise, with bright colours, superb detail, and ultra-smooth playback thanks to G-Sync letting your video card pump out frames without getting in the way of the monitor's native refresh rate. It is a literal game-changer.

Even if you're not a gamer, the smooth desktop performance is still very easy on the eyes.

The physical monitor itself is a little more divisive. In keeping with the gaming-focused Predator branding, the XB1's base is a bi-coloured delta shape that looks suitably aggressive. It's very sturdy, though, the monitor can even be switched from landscape to portrait view, and two USB3 ports on the back add extra connectivity. Height adjustment is also very versatile – no need for a phonebook or thick dictionary to prop up your monitor to a healthy height.

One thing that particularly impresses about the XB1 is its almost non-existent bezel. It's a thin strip of plastic only a millimetre or so thick, so if you do happen to have the money to spend, this is an excellent choice for a multi-monitor setup. Flight and racing sims would look amazing.

The price is a little on the exorbitant side, though. A non-G-Sync monitor with a similar spec costs almost half of the XB1's \$1049, so it comes down to whether you



think super-smooth performance is worth the premium. Our judgement? If you're a serious gamer, there's absolutely no doubt. It's worth it.

David Hollingworth

KEY SPECS

\$1049 • www.acer.com.au
4ms response time • IPS panel • 2560x1440 resolution • G-Sync 1000:1 contrast ratio • 27in panel • 1 x Display Port & 1 x HDMI 1.4 Port

OVERALL



Acer Predator XB1 XB281HK

...OR 4K RESOLUTION AT A MORE PEDESTRIAN G-SYNCHED 60HZ

The Acer XB281HK is very much a gamer's monitor, but it takes a different path to delivering the experience than the XB271HU which David reviewed above. While the 27in XB271HU offers a relatively standard 2560x1440 resolution but at up to a screaming 165Hz, the ever so slightly larger 28in XB281HK displays in 4k (3840 x 2160), but only tops out at 60Hz. Both feature G-Sync to butter up the frames, but it's the ultra-rarity of G-Sync at 4K that makes the Acer XB281HK so interesting.

Whether the Acer XB281HK appeals to you depends entirely on the GPU powering it. I tested it at home over the Christmas break where I run an Nvidia 980Ti, and I was able to play Fallout 4, Assetto Corsa and War Thunder at the highest detail, rock solid at the maximum possible 60FPS, plus a smattering of other games, and again, G-Sync delivered silky smooth frames. It is true that G-Sync at 144 or 165Hz will look even smoother, but I personally think that the added detail and crispness of 4K is the better way to go. There were tangible

gaming benefits, with distant terrain more detailed, and generally visible. You can see more of the game world too, landscapes showed off a greater expanse, maps had a larger field of view, all up a definite competitive advantage.

On the downside it's a TN panel, unlike the IPS panel used in the XB271HU. Sat dead-on in front of it the colours and sharpness are acceptable, but move more than a few degrees off-centre and the view becomes an indiscernible yellow mess – thought that matters little as a solo PC gamer. What does actually matter in the real world is the screen's relatively poor colour vibrancy and brightness, being an unfortunate trait of most TN screens. Live with this for a while and you'll forget what you're missing and it's good enough, but any IPS screen will offer far more vibrant colours than what you will find here.

Further holding it back is its unsuitability as a work screen, as Windows and browser fonts were a little blurry – far worse than they should have been at 4K, and worse than 2560x1600



or even 1440 screens. But for a super high-res. game screen with G-Sync smoothness it's worth a close look, at least until 4K IPS G/Free-Sync screens come along later this year.

Ben Mansill

KEY SPECS

\$900 • www.acer.com.au
1ms response time • TN panel; 3840x2160 • G-Sync, 1000:1 contrast ratio • 28in panel VGA • HDMI, DisplayPort, USB3 Hub

OVERALL



Motorola Moto X Force

A GREAT HANDSET FOR CLUMSY CLOTS, MOTOROLA GUARANTEES THE FIVE-LAYERED SCREEN FOR FOUR YEARS

Motorola has a habit of coming up with a product everyone's gagging for, yet no other manufacturer has thought to produce. Last time it was the Motorola Razr Maxx with its enormous battery. This time, it's sheer toughness.

The Motorola Moto X Force is so rugged, so resistant to drops and screen breakage, that Motorola was perfectly happy for me to throw the phone at the floor, stamp on it and smash it as hard as I liked on the corner of a table during a demo. It's so confident in its ShatterShield display that it's guaranteed for an unprecedented four years against accidental breakage. Whether you bash the display by dropping it on the pavement, or throw it in the path of a rampaging elephant, Motorola is confident it will survive. Naturally, it's also splashproof, and won't necessarily go to its watery grave if you drop it in water.

There's another surprise: the Motorola Moto X Force isn't ugly. There's no lumpen protective chassis or bright yellow, building-site colour scheme. My review sample was clad in smart black "ballistic nylon" at the rear and surrounded by a gunmetal-grey aluminium frame. It's not the thinnest smartphone (10.1mm), nor the lightest (169g), but it looks smart and feels extremely well made.

You can even customise the phone's

look via the Moto Maker site. You'll find five different colours of nylon back, six "soft grip" rear panels and three types of "pebbled" leather panel (dark brown, light brown and black), plus engraving options and a choice of "accent" colours.

With so many protective layers covering the Moto X Force's 5.4in 2,560 x 1,440 AMOLED panel, there's a danger that quality will suffer. The ShatterShield stack is five layers thick, and the final layer is a super-tough, plastic screen protector. That's a lot of material for the light to pass through, and it shows.

Outdoors in bright sunshine, for example, the screen appears slightly washed out and lacking in contrast, and the readability isn't helped by a limited 337cd/m² maximum brightness. I'm not convinced the plastic topping will stay as spotless in the long term as a Gorilla Glass-fronted display, either. The softer plastic surface was already picking up minor scuffs after a week, and that will affect its ability to shrug off grease and grime in the long run. Motorola tells me the front layer is easy and cheap to replace in-store, though, so if it gets really bad, there is a simple way to fix it.

Finally, this isn't the most colour-accurate display, with many colours – particular mid-red tones – off beam. The result is a punchy and colourful display, but one that looks a touch over the top.

I have no complaints about the phone's speed. Inside, a Snapdragon 810 is backed by 3GB of RAM and an Adreno 430 graphics chip, which is the equal of every other flagship device around apart from the iPhone 6s. Sure, it gets a little toasty if you spend 20 minutes or more playing Riptide GP2, but the nylon back helps insulate your fingers from the worst of the heat.

Its battery life is even better, as the enormous 3,760mAh battery squeezed inside the Force delivers seriously impressive stamina. Even with comparatively heavy use – a bit of gaming on the way to and from work, plenty of camera testing, and my usual load of web browsing and messaging – the Force would always get me through a day of use and some way into the second. Moreover, it lasted a stellar 15hrs 12mins in our video-run-down test and is lightning-quick to charge. Using the Turbo Charger supplied in the box, the phone hit 80% in a mere 50 minutes.



The other thing I like about Motorola handsets is the company's insistence on running all-but-pure Android on its devices. Here, you get Android 5.1.1, with an upgrade to Marshmallow promised, and it's embellished with the usual accoutrements. For instance, attentive display keeps the screen on if you're looking at it, and you can add movement recognition – a double "karate" chop gesture activates the phone's torch mode.

I'm less enamoured with the 21-megapixel camera. Yes, it's capable of good-quality snaps, but it's one step behind the best. Its main problem is the lack of optical image stabilisation, which leads to shaky photos. Nor am I keen on the amount of noise reduction applied to low-light shots. This lends photographs a rather soft, smeary look. At least video quality is up to par – plus you can shoot at up to 4K – with effective digital image stabilisation and smooth exposure transitions when you pan from light to dark areas.

The one hole in the Moto X Force's lengthy list of features is a fingerprint reader, which is disappointing for the price. As is the handset's middling display quality and that slightly off-the-pace camera.

Still, Motorola's newest smartphone gets an awful lot right. Chief among its many pluses is the fact that the handset is as tough as the proverbial old boot, with its five-layered screen, and its battery life is terrific. For the serial phone smashers around the globe, it's an absolute revelation.

Jonathan Bray

KEY SPECS

\$900 • www.motorola.com.au

Octa-core 2GHz Qualcomm Snapdragon 810 CPU • Adreno 430 GPU • 3GB RAM • 32GB storage • 5.4in 2,560 x 1,440 AMOLED display • microSD slot • 21MP/5MP rear/front cameras • 802.11ac Wi-Fi • 4G • Bluetooth 4.1 LE • 3,760mAh battery • Android 5.1.1 1yr RTB warranty (4yr screen cover) • 78 x 9.2 x 150mm (WDH) • 169g

OVERALL





ASUS Z170 SERIES MOTHERBOARDS UNLEASH THE INTEL 6TH GENERATION CORE CHOOSE THE BEST



- | | |
|----------------------|---|
| B REAKTHROUGH | Experience leading performance from world-class engineering. ASUS holds over 900 patents and innovates endlessly to push technology's boundaries. |
| E ASY TO USE | Build your own PC with ease thanks to user-friendly hardware and software. Q-design features and media-acclaimed UEFI BIOS provide a hassle-free DIY experience. |
| S TABLE | Industry-leading 5X Protection II ensures long-term system reliability. Extensive testing and complete QVL guarantee compatibility with a wide range of devices, plus leading UEFI stability and support. |
| T RUSTED | ASUS is the most award-winning motherboard maker. With over 500 million motherboards sold, ASUS is the brand you trust. |



BlackBerry Priv

IT'S BULKY AND HAS FOIBLES, BUT THERE'S A LOT TO LIKE ABOUT THE PRIV, INCLUDING ITS PHYSICAL KEYBOARD

This is the handset BlackBerry should have produced years ago. Not only does it run Android, so it can combine the platform's apps and mature OS with BlackBerry's own strengths, it also includes a hardware keyboard and messaging software.

The screen is a sharp 5.4in, 2,560 x 1,440 AMOLED display with curved edges. Its contrast is incredible, and the colours are intense, vibrant and saturated. The Priv looks great: the curved edges lend the phone an unusual look, and the rear is clad in rubberised plastic with a carbon-weave finish.

And then there's the physical keyboard, which slides out from beneath the screen with a satisfying thwack. It's classic BlackBerry: sculpted keys help you locate each one with the tip of your thumb, ridges embedded between each horizontal row keep typos to a minimum, and the key action is nice and positive. Plus, it's backlit, so you can see what you're typing in the dark.

I love the design, but still question its usefulness. BlackBerry's excellent touchscreen keyboard, which appears when the physical keyboard is tucked away, is adequate for most tasks. The placement of the hardware keyboard also causes problems. With so many of Android's text fields located at the top of the screen, I found it a stretch to reach up and tap to locate the cursor then back down to the keyboard at the bottom.

Still, the keyboard does come into its own in certain situations. If you're writing a long email, for instance, it's nice to be able to see a whole screen of text all without a great slab of keyboard obscuring most of it. It's even able to double as a touchpad.

The downside of the keyboard is, inevitably, bulk. The Priv is a portly 9.4mm and heavy at 192g. I'm also not keen on the sharp corners, which had a tendency to catch awkwardly on the lining of trouser pockets.

BlackBerry makes some changes to Android 5.1.1 via its own skin. This brings a host of extra features and customisations, including the famous BlackBerry "splat", used to indicate anything new, which appears at the



top-right corner of the apps on your homescreen and app drawer.

The BlackBerry Hub aggregates messages from various services into one, unified list. There's a host of other ingenious features to play with, too: pop-up widgets generate app previews directly on the homescreen with a flick of the finger; holding the homescreen button down generates extra, customisable shortcuts in addition to Google Now; and delving into the settings menu reveals a scattering of useful extras, including the ability to mute the phone and save power by flipping it over. The snooze feature is brilliant: don't want to deal with an email right now? Schedule it to go away and reappear in 30 minutes or tomorrow. You can also set it to pop up once you reach a certain location, or even when you connect to a preset Wi-Fi network.

What makes the Priv the Priv, though, are BlackBerry's extra security features. In an attempt to keep business users and privacy obsessives on side, full device encryption is activated by default, while the preloaded DTEK app monitors and provides advice on your security status.

It's also possible to see which apps are accessing which features on your phone, so you can see if a game is accessing your location when it shouldn't be, say, and even drill down to look at when and where the information was accessed. The only security feature that's missing from the BlackBerry Priv is a fingerprint reader.

On the other hand, the disadvantage of all these extra touches is that there's too much going on. Extra dots, icons and tabs litter the homescreen, the icons at the top of the notifications menu just look wrong, and when you add this to all of Android's usual notifications, it's a mess.

Furthermore, in the rush to squeeze all of these extra features into the Priv, it feels as if there wasn't enough time devoted to the software optimisation. The BlackBerry Priv has the same hardware inside it as the Nexus 5X, so it ought to feel smooth and slick. Alas, BlackBerry Hub feels a little sticky, there's a sense of lag when scrolling up and down web pages, and, in general, the phone feels off the pace.

That's disappointing, because the Priv's hexa-core Qualcomm Snapdragon 808 chip is powerful and backed up by 3GB of RAM. The rest of the specification isn't bad either. Wireless connectivity runs to 4G, 802.11ac Wi-Fi, Bluetooth 4.1 LE, and NFC. There's 32GB of storage, with a microSD slot for expansion up to a theoretical 2TB, and the battery has a large 3,410mAh capacity, which delivered 11hrs 10mins in our looping video test. Expect a solid day with moderate use, but not much longer.

The final aspect of performance is the camera. The good news is that the Priv's 18-megapixel camera is capable of capturing crisp, detail-packed images in most situations, and is particularly good for close-ups. With optical image stabilisation, phase-detect autofocus and a wide f/2.2 aperture, even low light situations won't spell disaster.

Despite my moans, I enjoyed using the BlackBerry Priv. In the world of bland, homogenous phone design, it stands out as a beacon of individuality.

Jonathan Bray

KEY SPECS

\$1040 · www.au.blackberry.com

Hexa-core 1.8GHz Qualcomm Snapdragon 808 CPU · Adreno 418 GPU · 3GB RAM · 32GB storage · 5.4in 2,560 x 1,440 AMOLED display · microSD slot · 18MP/2MP rear/front cameras · 802.11ac Wi-Fi · 4G · Bluetooth 4.1 LE · 3,410mAh battery · Android 5.1.1 · 1yr RTB warranty · 77.2 x 9.4 x 147mm (WDH) · 192g

OVERALL



Sony Xperia Z5 Premium

MEET THE WORLD'S FIRST 4K PHONE. IT'S AN AMAZING FEAT THAT RAISES JUST ONE QUESTION: WHAT IS IT ACTUALLY GOOD FOR?

So, congratulations to Sony for a true world first: a phone with a 4K screen. That's 8,294,400 pixels spread over a screen measuring 5.5in from corner to corner, giving a pixel density of around 806ppi. Why? Excellent question, especially since the Z5 Premium mostly stays in 1080p mode to save battery life.

But we'll come to that. First, how is it to hold? That depends on how you get on with big phones. At 5.5in, the Xperia Z5 Premium is a monster. Ours arrived bedecked in gaudy gold, which wouldn't be my first, second or even third choice, but it can also be bought in stylish black or chrome. The finish feels slippery in the hand, but Sony has given the front and back a small lip, meaning it doesn't slip and slide when left on a flat surface.

If it wasn't for the golden finish, the Z5 Premium would look like a larger Xperia Z5 – which, in effect, it is. It has the same fingerprint reader on the right-hand edge, the strangely placed volume rocker at the bottom and a micro-USB charger on the underside. There's no USB Type-C here. Like its smaller siblings, the Z5 Premium has an IP56/IP68 rating, which means you can wash off dirt "under the tap", according to Sony, as long as all ports are sealed using the attached covers.

The two phones share the same excellent 23-megapixel camera, too, with a 1/2.3in sensor and SteadyShot image

stabilisation. Tap anywhere on the screen and the phase-detect autofocus will lock on in just 0.03 seconds. The results are superb, with contrast, colour and detail all exceptionally good, although it does struggle a little in low light. And, of course, the Z5 Premium shoots in 4K with superb video stabilisation.

Moreover, day-to-day performance is as you'd expect: it's buttery smooth, with no problems when multitasking or undertaking more complex jobs. Our benchmarks bore this out, with the Z5 Premium near the top of the phone table in our Geekbench 3 tests (with 1,350 single-core and 4,105 multi-core).

Perhaps a more critical area of performance is battery life. Sony's power settings are rather aggressive out of the box, and in daily use that means you can sometimes go for two days without a charge. When put through our standardised battery test, where such advantages are overruled by screen activity, the Z5 Premium lasted 9hrs 38mins before giving up. That's below average, and more than an hour shorter than the regular Z5.

In the real world, the battery life will be dictated by just how much you use the full power of the 4K screen. Using IPS technology, it hits a highly respectable maximum brightness of 545cd/m², a chunk behind the Z5's 684cd/m². It also trails the Z5 on sRGB gamut coverage: 97.6% to the Z5's 99.4%. In its defence, the Z5 Premium does win on two metrics: the black level is lower (0.36cd/m² to the Z5's 0.54cd/m²) and the contrast is greater, weighing in at 1,255:1 compared to the Z5's 1,078:1.

However, the key difference between the Z5 and Z5 Premium, is the 0.3in of extra screen, and the obscenely high resolution it's capable of displaying. Now, on a 40in TV, the more pixels the better, especially as you sit a comfortable distance from a television. For a 5.5in screen to need

that many pixels... well, let's just say I'm not convinced it's necessary. There comes a point when our eyes can't tell the difference. For a phone held around ten to 12in from the face, where does that point come? Well, Apple argued for 300ppi when it announced the first Retina display on the iPhone 4. Others say it could be closer to 500ppi, if you have particularly good eyesight. Anything higher, and you're into "magic beans" territory.

A reminder at this point: the Z5 Premium delivers an absolute resolution of 806ppi.

So, how does it do? Well, that's surprisingly hard to test, because there are only two apps that put the screen into 4K mode: Sony's own Video and Photo apps. Everything else displays in good old 1080p; YouTube and Netflix don't support 4K streaming to mobiles, instead stating they'll be upscaled to the same level of detail. That's a great claim, but it's also conveniently hard to substantiate, given what we know about the human eye.

So, you can watch the bundled 4K videos, which all look rather splendid in their eye-popping, colourful, sharp glory in the Sony app. "This is great," you think. "I could get into this." Then you download a free video app, such as MX Player, watch the same video and realise it also looks eye-popping, colourful and sharp, despite the fact it's actually locked to 1080p resolution.

The Sony Xperia Z5 Premium is a fine phone. But one vital detail that holds me back from recommending it: in every key area, other than screen size, it's no better than the Sony Xperia Z5. Which costs over \$400 less. If you want a big screen and all of the Sony features – great camera, water resistance, looks – then go for it. Just don't be hoodwinked by the 4K marketing.

Alan Martin

KEY SPECS

\$1199 • www.sony.com.au

Octa-core 2GHz Qualcomm Snapdragon 810 CPU • Adreno 430 GPU • 3GB RAM • 32GB storage • 5.5in 3,840 x 2,160 IPS display • microSD slot • 23MP/5MP rear/front cameras • 802.11ac Wi-Fi • 4G • Bluetooth 4.1 • 3,430mAh battery • Android 5.1 • 1yr RTB warranty • 76 x 78 x 154mm (WDH) • 181g

OVERALL



◀ As we've come to expect from Xperia phones, the Z5 Premium is "dust tight" and waterproof





Microsoft Band 2

MUCH MORE COMFORTABLE TO WEAR THAN THE ORIGINAL AND PACKED WITH FEATURES, BUT IT'S STILL FLAWED

The original Microsoft Band wasn't a masterclass in design. Part fitness tracker and part wrist-borne ASBO tag, Microsoft's first foray into the fitness-tracking space was an odd hodgepodge of health-tracking sensors, questionable design and smartwatch-esque features. The Microsoft Band 2 attempts to right those wrongs.

The only familiar thing about the Band 2 is its narrow, rectangular display. Almost everything else has changed, and for the better. Gone is the flat screen and bulbous all-black design of the previous model. The strap is now wider, by a significant 3.5mm, and a larger, curved AMOLED display takes centre stage.

Metal edges surround the bright, clear screen and roll around the rear. Even the adjustable clasp is made from metal. Wrap it around your wrist, and the biggest improvement is soon obvious – it's now quite comfortable to wear. The metal latch provides a good amount of adjustability, and the wider, more pliant strap means that getting a snug fit doesn't involve cutting off the blood supply to your hand.

One thing that remains is the proprietary charging cable, although Microsoft has tweaked the design. It now snaps magnetically to the end of the strap, with small plastic prongs holding it in place. The best news, though? The Microsoft Band 2 charges from empty to

80% in only half an hour, with the final 20% taking another hour to eventually trickle-charge.

BEYOND A BAND

While the original Band had ten sensors, the Band 2 turns it up to 11, adding a barometer to the mix. This allows the Band to more accurately estimate how much altitude you lose or gain on your runs and rides, or simply measure how many flights of stairs you climb during the day.

The full list of the Band 2's sensors is impressive. It measures your heart rate, skin temperature and galvanic skin response. It also has a three-axis accelerometer and gyroscope, GPS, an ambient light sensor and a microphone for sending instructions to Cortana – the list goes on and on. It's this team of sensors that fires raw data into the Microsoft Health app on your phone and then up to Microsoft's cloud, where all of the juicy data is chewed through and analysed, before being fired back to the Health app.

The sheer ambition of the Band 2 is difficult to fault. This is a fitness band that wants to be as useful to a gym-frequenting exercise fanatic as someone who just wants a clearer idea about how much (or little) exercise they get on their daily grind.

Strap it to your wrist and forget about it.

It will still tell you how far you've walked, how many calories you've used and even attempt to analyse how well you've slept. It estimates how many of the burned calories were fat and how many carbs. It seems versatility and hands-off ease of use are front and foremost of Microsoft's vision here.

The Band 2's interface is as simple and elegant as ever. The bright, crisp touchscreen tells the time by default (you can set it to time out and wake it with a button press if you want it to last a little longer between charges), while a stroke to the right gives a quick glimpse of the remaining battery life, Bluetooth connection and whether the heart-rate sensor is active.

Tap the screen and you get a quick overview of your current stats for the day: how many steps you've taken, distance covered, the calories you've burned and how many flights of stairs you've climbed, and you can also check your heart rate.

Swipe left on the homescreen and you'll see all the Band 2's apps and activities spread across a series of icon-studded tiles. What you see can be customised via the Microsoft Health app on your smartphone. This comes in Android, iOS and, naturally, Windows Phone flavours. Not a runner? Simply remove that option from the list. Not a golfer? No problem. If, like me, all you want is a Sleep tile, a Cycling tile and a Starbucks tile for bringing up your loyalty barcode, that's fine too – you can have up to 13 of the things, or as few as you like.

You can also choose to receive notifications from your phone, with emails, texts, Facebook and Twitter updates all on the menu – simply add the relevant tile in the app.

Emails, texts and social network updates come through to their own tab, and a quick tap of the message displays them on the screen, one word at a time – which is vaguely handy if you're running, not ideal on a bike.

EVERYDAY GREATNESS

The original Band was great as an everyday fitness tracker, and here the Band 2 still gets my thumbs up. I love being able to get an idea of how much exercise I've done during the day. The insights into my sleeping patterns and habits, as well as my resting heart rate (a raised resting heart rate is a reliable sign of fatigue or impending illness), genuinely provides a clear idea when to work out harder and when to give my body time to recover. It's all useful, interesting stuff, and it's all done without any intervention on my part. A big plus.

The pedometer functions seem pretty

accurate – they certainly tally with my Garmin Vivoactive. And the Band 2's sleep recording is far better than Garmin's. It was more consistently capable of recognising when I actually went to sleep, and wasn't so readily fooled by periods of inactivity sitting in front of the TV. Just like the Garmin, it splits sleep into light and "restful" (deep) sleep, as well as marking when I woke up or tossed and turned during the night.

STILL MY BEATING HEART

However, I'm less impressed by the Band 2 as a cycling companion. It suffers from the same limitations that put me off the first version. My biggest bugbear is the inaccuracy of the heart-rate monitor. If you rely on this to indicate when you're pushing yourself the right amount then you probably won't find the Band 2 particularly useful.

For example, I compared the recorded data from the Band 2 with a section of the same ride recorded on my Garmin Vivoactive. The differences are huge. The Band 2's heart rate trace is stair-stepped and coarse, whereas the Garmin outputs a far more believable set of data.

The speed trace from the Band 2

looks suspect, too, indicating that I was constantly speeding up and slowing. This was on a section of road that was relatively clear, when I was cruising along at a steady pace, so there's something clearly awry.

Microsoft claims around two days of battery life for the Band 2 – exactly the same as the previous version – but it makes the proviso that "advanced functionality like GPS use will impact battery performance". This is true: my experience of the original Band was that GPS-tracking and heart-rate monitoring absolutely destroyed the battery, and the Microsoft Band 2 is no different.

Two hours of commuting on the bike (one hour in the morning, one in the evening) hammered the battery from about 90% to the halfway mark, which left me having to charge the Band 2 at the end of the first day. By comparison, the Garmin Vivoactive uses around 10% of its battery life per hour with a wireless ANT+ heart-rate strap attached.

Frankly, I was hoping for more from the Band 2. It's possible to tease out a little more longevity by changing the screen brightness from automatic to low, turning off Bluetooth completely, or even – perish

the thought – disabling the heart-rate monitoring, but it's never going to be my go-to device. And I suspect the same goes for any moderately keen cyclists – circa four hours of GPS and heart-rate tracking is, to put it kindly, below par.

For me, the Band 2 hasn't addressed some of its biggest flaws. Battery life still isn't long enough for long-distance cycle rides, and the inaccurate data rules it out as a reliable training partner.

That doesn't make it a failure: it's much more comfortable than the original Microsoft Band and offers a fine blend of features, design, fit and price that may be perfect for you – provided you're not quite as picky about knowing your heart rate.

Sasha Muller

KEY SPECS

\$379 • www.microsoftstore.com/au

32 x 12.8mm AMOLED display • 320 x 128 • Bluetooth 4 • optical heart-rate sensor • gyrometer • GPS • skin-temperature sensor • UV sensor • capacitive sensor • galvanic skin response • microphone • barometer • haptic vibration monitor • 1yr RTB warranty

OVERALL



Xiro Xplorer V

HIGH QUALITY DRONES ARE DOING MORE AND COSTING LESS

Xiro has made quite a statement with its debut Xplorer V drone. It has entered the drone market with real potential to become one of the big players in the game. The stealth-looking quadcopter comes at an affordable price and is jam packed with great features and comes ready to fly straight out of the box.

The Xplorer V comes equipped with a camera that uses a Panasonic CMOS image sensor and is capable of shooting amazing 14MP stills (in both RAW and JPEG) and crystal clear 1080p HD video. The camera sits on a detachable 3-axis stabilized gimbal that does an incredible job of keeping the camera stable during flight and even in windy conditions. The gimbal can also be controlled via the remote so you have complete control of what you are shooting.

The Xiro app is an impressive partner for the Xplorer V, it provides FPV/live preview from the drone's camera, monitors drone information such as height, battery levels, Wi-Fi signal, metres per second climb or sink rate and also allows you to adjust manual camera settings such as ISO, aperture, metering and resolution.

The app also has a few standout features that give it an edge. The 360 Selfie, where you select an object or person and the drone will fly circles around the object, the Follow Me function where you select a person or object and the drone will follow the selected object and the waypoint option where you can pick up to 16 points on the map and the drone will fly automatically to each point.

Flying is done using the included controller and is relatively easy once you get used to what everything on the control is in charge of. There are three flight modes to choose from: Level 1 limits the drone's height and speed, Level 2 which gives you a bit more speed and height and then Level 3 which allows you to push it to the limits of range and speed. A few other useful buttons are the Home button, when pushed the drone will automatically return to its take-off place, auto take off and land and IOC which helps you if you have no idea which way the drone is facing. As well as these there are the two joysticks which take control of the flying and some dials at the top that control the gimbal and indicator brightness.



The auto return home and lost connection protection feature I appreciate as I am always frightened of my drone flying away. If the connection is lost or the battery is getting low the drone will return home to its take off location, so you won't run out of battery and watch it crash.

The Xplorer V is fun to fly, easy to use and the camera does a great job with both stills and video, couple this with a good app and the affordable price tag for a drone of this quality and it's easy to see why I'm a fan.

Tim Frawley

KEY SPECS

\$1498 • www.xirodrone.com

25 minute flight time • 500m operating range • HD 14mp still • 1080p video • 3-Axis Stabilized GoPro 3 and 4 Support • 3S 5200mAh LiPo Battery • Micro SD

OVERALL



It's not a toaster*

*But it will read any SATA drive via the world's fastest USB port



VOLANS DS31

Aluminium USB 3.1 Gen 2 (10Gbps) HDD
Docking Station with RAID

AVAILABLE FROM:

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Centre Com Superstore (VIC)
www.centrecom.com.au

Computer Alliance (QLD)
www.computeralliance.com.au

PLE Computers (WA)
www.ple.com.au

Labs Apps

Taskmator

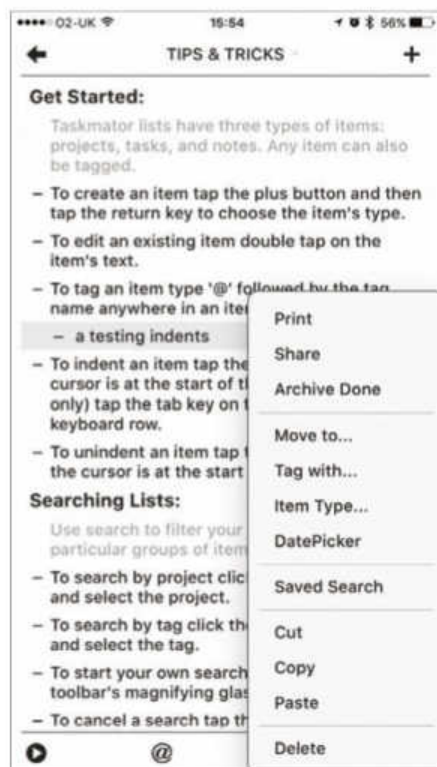
\$7.99 · iOS

Something strange is afoot. After a few decades of increasingly complicated file formats, people are moving back to using the oldest one of the lot: plain text. And that's not just for writing documents, using text-only formats such as Markdown. It's also for that most controversial and complex of things, managing your tasks and time.

At the forefront of plain-text task management is the syntax invented by Hog Bay Software for its TaskPaper Mac (and originally iOS) applications. With TaskPaper, documents are only plain text. "Projects" are created by writing the title and adding a colon: everything below that is part of the project. Actions are created by simply starting a line with a hyphen. Tagging and due dates are done by adding "@tag" or "@due(2008-05-31)". When a task is done, you just add "@done".

The great thing about this is that you can manage your tasks from any application that reads plain text. However, if an application is written to support the

✓ The app's search feature lets you find anything in your document



format, it can do more – for example, striking through tasks that you've marked as done.

On Mac, TaskPaper – from the developer of the original format – has always been one of the best apps around. But TaskPaper on iOS was canned a while ago, as the developer wanted to focus on the Mac app. In an extremely generous move, he open-sourced the application's code – and Taskmator is built on this.

Taskmator works on iPhone and iPad, syncing with Dropbox so you can always access your task lists. Its interface is simple, including all the features that you want from a Taskpaper-format to-do-list manager. There's a navigation button that allows you to leap to single projects within a document and focus on them, although, weirdly, it looks like a video play button.

There's a tag menu, which isolates and lists items that have been tagged with whatever you choose. The search feature lets you find anything – tag or otherwise – in your document. And, finally, there's a catch-all menu that lets you do things such as change item type (from to-do to project or note, and vice versa), pick due dates for reminders, move items around a project and more. These reminders are also put into your iOS (and thus iCloud) reminders, which means you'll get them on all your Apple devices – and that includes your Mac.

It's all very easy, and, because of the flexibility of the tagging system, it can support pretty much any kind of time-management system (it's particularly good at supporting the "Getting Things Done" system created by David Allen).

The biggest question, though, isn't whether this is the right app for you: if you're an iOS user, and into plain-text organising, then it's a good low-cost choice. No, the more important question is whether this kind of plain-text, highly unstructured system will work for you at all. If you're prepared to invest the time, you'll end up with a robust and highly portable way of managing tasks. But you do need to invest the time.

Ian Betteridge

OVERALL



Twilight

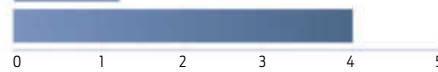
FREE · Android

Exposure to screens late at night can disrupt your sleep, leaving you weaker the next day. The simple solution is to stop using phones and tablets before going to bed, but that's easier said than done, and that's where Twilight comes in.

Functioning in a similar way to Flux for desktops, Twilight adapts the colouring of the screen to fade out the blue lights as the sun sets, tinting everything in a soft red glow when it really matters. It takes a little getting used to at first, but if it helps you get better-quality sleep, then it's well worth taking the time to adapt.

Alan Martin

OVERALL



▲ Twilight tints everything in a soft red glow as it draws closer to bedtime

Awesome Pop-up Video

FREE · Android

Watching video on a phone has one key problem: you can't multitask and you have to keep the video on screen, otherwise the playback stops. If you need to reply to a text or tweet, then you'll just have to put your video playback on hold – aside from on a couple of phablets that have multitasking built in.

This app solves that, letting you keep a windowed video player over the top of your Android screen. Put a playlist on and go about your business – although if you want to watch videos longer than five minutes, you'll have to pay \$2.71.

Alan Martin

OVERALL



▲ Awesome Pop-up Video allows you to keep a video player onscreen

Labs Briefs

Logitech G502

\$120 • www.logitech.com.au

No box is left unchecked with this rodent. It's perfectly ergonomic for most hand sizes, with buttons you won't ever miss or accidentally hit. Rubber inlays on both sides work with any hand position and you won't be fudging up a move through sweat-slip (new word!).

The DPI is adjustable in increments of 50DPI via the excellent software, all the way up to 12,000DPI and you get polling rate options too, covering 125, 250, 500 and 1000Hz. Profiles for unique settings can be saved to Windows, or the device's onboard memory, and they can switch automatically when a game is fired up, allowing a Windows desktop profile to be kept separate.

It's light, if you like it that way, or heavy thanks to the five 3.6g weights that can be added. And, it looks like it just came out of a wormhole in deep space, but without being too ridiculously styled that it compromises function.

Ben Mansill

OVERALL



Samsung Wireless Audio 360 Speaker

\$249 • www.samsung.com.au

Wireless speakers are pretty much a dime a dozen, but Samsung's decided to enter the market anyway, and made a pretty good fist of it. The Wireless Audio 360 is a very versatile piece of kit, designed to operate in a number of ways – you can set it up as a single speaker, set up multiple speakers in multiple rooms for streaming a single track, or even create an ad-hoc HiFi set-up by linking them together.

Basic set-up of a single unit is simple – you just download the Samsung Multiroom app, pair it with your speaker, and away you go. This only works with music on your phone, and most streaming services (via the app), though Google Play Music is not one of them. That's via a Wi-Fi connection, but you can also connect direct via Bluetooth, and listen to any music source from your device.

Sound quality is strong, though a little watery, but the on-speaker controls are at least versatile. It's a great unit for the price, but there are better speakers on the market.

David Hollingworth

OVERALL



Rapoo V20 Optical Gaming Mouse

\$35 • www.rapoo.com

The Rapoo V20 is not the greatest mouse in the world. It feels a bit light, is very plasticky and the optical sensor, whilst accurate, isn't anything that will set the gaming world on fire, but the combination of features and the unbeatable price make it one of the best budget gaming mice we've ever seen.

The right handed mouse is nicely designed and fits comfortably in the hand with all five buttons in easy reach and the scroll wheel is one of the better ones we've used in a while. Under the plastic shell is a new Rapoo ARM core, some built in memory for profiles and macros and one of the brightest RPG lights we've seen. It makes for quite the eye-catching spectacle as the mouse cycles through the colours, with the glow shining bright through the charmingly ostentatious lightning patterns covering the body.

Daniel Wilks

OVERALL



Logitech G303 Daedalus Apex

\$99.95 • gaming.logitech.com

There's an irony in that actual pro gamers mostly don't use massive, button-encrusted mice. They like compact, minimalist models with an emphasis on the sensor and overall ergonomics. So of all Logitech's top-tier mice, the G303 is probably the most likely to appear at tournament level. It's small in the hand but suits a range of different grip styles, with slight bias toward "claw grip".

The short, symmetrical design favours function over form, and serious gamers only need six programmable buttons, apparently. Metal spring button tensioning sounds like marketing bumf but means precise, satisfying clicks, and the scroll wheel is one of the best on the market right now. Logitech's PWM3366 optical sensor can be tuned for different surfaces and supports DPI from 200 to 12,000! The diamond-shape and small footprint means this mouse has an ergonomic learning curve, and the customisable coloured lighting is silly, but if you take your game seriously, the G303 will serve.

Anthony Fordham

OVERALL



House of Marley Legend ANC

\$350 • www.thehouseofmarley.com.au

The Legend ANC cans are real lookers, alright, with aluminium and wood (Sapele) inlays, but sound is what's important here. Sound and, as always, comfort. The latter isn't so great. They're heavy and they feel it, clamping your head uncomfortably and weighing it down. They are neither on- or over-ear, with the speaker grills touching your ear surface and the cushion cups doing little more than compressing the edge of your ears. On the plus side, even at extreme volume nobody around you will be disturbed by leaks.

The sound is thick and rich, pretty good for the price although not in Sennheiser league for similar bucks. Audio is clear with good absence of hiss. I would totally rock out to these. The louder and bassier the music, the better these sound. Crisp classic or strings are also handled well but a little boomy.

Active noise cancellation is poor. But I wouldn't take a long flight with these more because after even an hour you need to take them off and rub the soreness away.

Ben Mansill

OVERALL



Rapoo Power Bank P300

\$38 • www.rapoo.com

A small avalanche of new Rapoo gear hit the Labs just before Christmas.

Funky stuff like the drone on page 53, and the cheap but impressive mouse on this page. And this. Normally we'd gratefully receive yet another battery pack, think about it for five seconds then chuck it on the pile with all the others. But this one I'm keeping. It's so fetch.

Why? It's metal, and shaped to fit the hand better than your regular brick. Which is good because the torch is actually a real torch, with a Philips LED and lens. I'd take it camping. It can light up a dark family room, but for me will serve solid duty instead shining into broken PCs. With aplomb.

And at 10,400mAh she's a right munter. That's 5.7 iPhone 6's worth of juice. Packs with that sort of capacity used to be enormous and heavy, so this is quite impressive.

So, it looks nice, feels great, properly lights up the dark and stays charged almost forever if you want it to be just a torch and emergency power source. That's alright in my book.

Ben Mansill

OVERALL



Corsair Carbide 400Q

\$159 • www.corsair.com

For many years, a pure black high-quality but minimalist quiet ATX case was something you could only get at the top end of the market. You had to pay more, for less. Now, the Carbide 400Q gives you the minimalism you want at a price that makes sense.

The all-steel construction isn't exactly light, but it is solid, and lack of an optical drive bay means nothing to break that Monolith-like fascia. Sound dampening material on the side panels further cuts unpleasant audio from the two included 120mm fans, and your PSU can be hidden away underneath a plastic cover. Plenty of cable-routing slots keep the build tidy, and a magnetically-secured top cover flips off so you can mount a water-cooler radiator. A couple of USB 3.0 ports on top boost convenience, while mesh screens behind all intakes keep the dust out. Overall, a solid inexpensive case that conveys quality beyond its sticker price. And it's quiet, too.

Anthony Fordham

OVERALL



KEF Muo Bluetooth Speaker

\$549 • www.advanceaudio.com.au

Bluetooth speakers are thruppence a sheaf these days, and every HiFi brand worth its salt has one (even B&W). Now KEF joins the crowd with an ultra-compact, ultra-premium little speaker designed to take on the likes of the Bose Soundlink Mini II, albeit at almost twice the price.

British HiFi wizards KEF are well-respected at the ultra-high-end, and this little speaker takes design cues from the floorstanding KEF Muons... which cost \$225,000. No really. The Muo drops the N and nearly a quarter of a million dollars to give you two unique 50mm drivers and a bass "radiator" (essentially a speaker cone without a voice coil and magnet) wrapped in a stout aluminium wedge-shaped case.

The Muo pumps table-rattling bass like many other speakers in this segment, but the mids and highs have a clarity and transparency that long-term KEF fans will recognise. The Muo sounds more detailed and has much better presence than the similarly-size Bose Soundlink Mini II, but to the tune of a \$249 premium? Only your ears can decide.

Anthony Fordham

OVERALL





BLOCK VIRUSES

DON'T BE AFRAID: IT'S EASIER AND CHEAPER THAN EVER TO PROTECT YOURSELF FROM THREATS - JUST MAKE SURE YOU CHOOSE THE RIGHT SOFTWARE

We're not going to scare you with stories of rising virus attacks, ransomware and zero-day exploits. If there's one thing this Labs shows, it's that the average person is now safer from attack than ever – if they're using Windows 8 or Windows 10 at least. That's because the past three months have seen a huge improvement from Microsoft's built-in security tools.

Satya Nadella shouldn't uncork the bubbly quite yet, though, as the top, paid-for security suites still offer better protection, not to mention a raft of genuinely useful features. Things such as anti-theft protection, where you

can track your laptop if it goes missing. Powerful parental tools to control when your kids go online, and what they get up to are also very important, along with management features that will be a massive boon to anyone who needs to protect more than one PC.

And to an extent, we should thank Microsoft for this. If it hadn't developed its own anti-malware then security suites may have been stuck moribund in the my-protection-is-better-than-yours game. Instead, you now have a wealth of choice whether you go free or paid-for. The only question now is which to choose.

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How we test: Q&A with Simon Edwards, expert antivirus tester

ANTIVIRUS SOFTWARE IS ARGUABLY THE TOUGHEST TYPE OF PRODUCT TO PUT THROUGH REAL-WORLD TESTING. WE REVEAL THE THINKING BEHIND THE TESTS

If you want to give security software a proper test then you need to draft in the experts. That's exactly what we did for this Labs, drawing upon the knowledge and expertise of Simon Edwards, chairman of AMTSO (Anti-Malware Testing Standards Organization) and technical director of Dennis Technology Labs. Thanks to the efforts of Simon and his team, we had exhaustive results to draw upon: the results here are based on nine months' testing in total.

This isn't just to see how well they cope with threats. We were just as keen to see how antivirus software affected PCs' performance, which is why we're able to print an accurate "performance impact" score for each product.

To dig a little deeper into the tests, and the thinking that went on behind them, we gave Simon the same sort of grilling he gives his products.

An easy question to start with: what kinds of threats do you test for?

We aim to use whatever threats are currently prevalent. We used to download a lot of infected email attachments [because that's how viruses were then frequently transmitted] and I'm starting to think we should do that again, because they seem to be on the increase. In the main, though, we focus on exploit-based web threats that attack victims' systems automatically and often invisibly. The exceptions are those attacks that encrypt users' files and hold them to ransom. Those attacks are obviously very visible once the malware has executed correctly.

How do you make your tests realistic?

We take live web threats that exist on the internet at the exact moment of testing. We configure the security products realistically, which is to say, "default settings" for consumers and using advice provided by the vendors of business products. We use live internet connections and try not to simulate anything at all. We also avoid automation as much as possible, so we can tackle new threats more easily than if we had to monitor and train an automated system. And we use real PCs, not virtual machines.

You use Windows 7 for testing, which might seem an odd choice with Windows 10 now available. Why?

This is by far the most popular operating system out there [according to netmarketshare.com, Windows 7 currently has 55.7% market share to 7.9% for Windows 10 and 5.6% for OS X]. We stuck with XP much longer than expected, because we try to create tests that affect the majority of computer users and not only those who have bought a new PC. Even when Windows 10 becomes the most popular consumer OS

"We're trying to create tests that affect the majority of computer users and not just those who have bought a new PC"

– assuming that it does – Windows 7 is likely to remain popular within businesses. We'll continue to use it for business testing until Windows 10 dominates.

Are the results still relevant to someone using a Windows 8 or Windows 10 PC?

Yes, absolutely. The sorts of attacks that we see, which are largely exploit-based web threats, attack third-party applications rather than Windows components. So we've found that a drive-by attack that abuses Java to download and run a Windows-compatible executable file, VBScript or PowerShell script will almost certainly work on Windows 8 and 10, as well as Windows 7. Most likely it will work on Windows XP too!

What's different to the way you test and the way your rivals test?

We publish very detailed methodologies of how we test in every report that we put out. Compare how we test, and how we explain how we test, to the way our competitors operate. There is also a set of testing guidelines published by AMTSO, which provides a great way to assess a test's worth. It is available

from www.amtso.org/download/amtso-fundamental-principles-of-testing/.

How do you select which products to test?

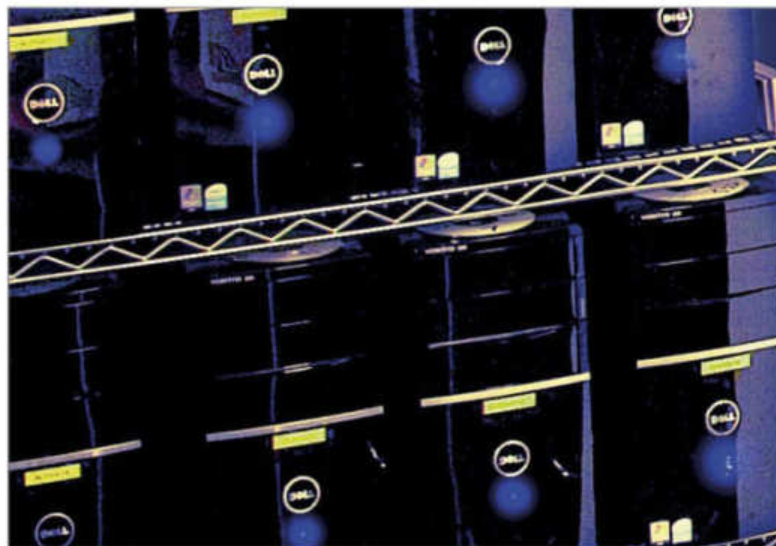
We try to cover the most popular, as shown by various market research sources. For example, Microsoft, which has exceptional insight into what runs on Windows, knows which anti-malware products people use and we're able to see that data. There are more public sources of information, too. The way we test is very labour-intensive and people always ask "why didn't you include Product X?" We run a "guest product" slot every three months and assess a new product each time around.

What are the biggest threats to our PCs these days?

Vulnerable applications are dangerous, so updating Windows and third-party applications can make a huge difference. Plenty of people are vulnerable to being tricked, which is why we still see fake video codec links to malware and malicious email attachments out there. So-called "malvertising" is a problem, because you can be served malware from legitimate sites that happen to have a connection (often very removed) to an unscrupulous or compromised advertising platform.



> Simon is chairman of the Anti Malware Testing Standards Organization



- ▲ You can download detailed reports from pcpro.link/257vir
- Genuine PCs, not virtual systems, were used to test each security suite

Are there still myths about viruses that really bug you?

I am more bothered by the misleading claims of anti-malware companies, and particularly those who claim to offer “next-generation” products, that “antivirus is dead” and their alternative is magically better. What they mean is that a basic signature-driven scanner is insufficient, and they are right. But established security firms provide far more than a basic antivirus scanner.

In many cases, in my opinion, these next-gen firms are simply new anti-malware companies with less experience and are labelling what they provide as being superior alternatives to anti-malware. There are very few test results out there for these new products, and the reason is that many don't want to be tested. You can draw your own conclusions as to why that might be.

Is there really much difference in the way companies go about protection these days?

The market is pretty mature and has identified the usual threat vectors, so you'd expect them all to offer URL filtering, exploit detection, antivirus scanners and behavioural sandboxes or similar.

As demonstrated by test results, not only from us but from other reputable testers, they're often very different in terms of effectiveness. Although they may take similar technical approaches, clearly there are differences.

Do you think there's a genuine threat to mobile devices?

I do, but it's not the same as with desktop operating systems. Currently the mobile operating systems are fundamentally more secure than any consumer Windows

PC ever released. All of those Android threats you hear about require a user to be tricked into downloading and installing it. Even the really clever ones need a user to prod the screen at least once to agree to install it. Users will be tricked, so there is a threat, but it's not the same as the silent, automatic attacks we see on Windows.

What would you say to people who don't use antivirus protection? Is Windows 10 safe enough?

Windows 10 includes anti-malware

protection by default and the clever thing is that if you install a third-party product and fail to update it, Windows Defender will reactivate and step in to provide protection. Regardless of how you feel about Microsoft's attempts at anti-malware protection, this has to be better than nothing and in fact we've seen Microsoft Security Essentials improve enormously in recent months.

Finally, what antivirus protection do you use yourself?

No comment!

HOW WE TEST AND WHAT THE RESULTS MEAN

We test each package's core anti-malware features. Rather than artificially infecting target systems, we set them up in an environment that mimics how PCs become infected in the wild. This gives an accurate picture of how each security package fends off malware in real-world situations.

We not only look at whether the package provides protection against the threat, but how it handles the malware. For instance, is it blocked before it can install itself on the PC (our preferred result)? Does it run, but then the antivirus software detects and neutralises it? In the worst-case scenario, does the software allow the malware to run unimpeded?

We test against 100 such threats, giving a weighted score on how well it copes with each threat. The protection score you see at the foot of each review reflects that mark. For example, McAfee received a 93% score even though it blocked 95 out of 100 threats and neutralised three. However, because it allowed two threats through its defences, its protection rating was dragged down once our weightings were applied.

Underneath the feature table on p64, we also include historic protection scores: the average score for each product over the previous two sets of tests, which Simon and his team carry out every three months.

The false-positives score reflects how well the security packages handle legitimate software installs. Do they block the installation or prompt for user intervention, despite the fact it's legitimate? If it's incorrectly flagged, we list this as a false positive. The worst-case scenario is that an install is blocked and the user isn't told about it at all.

Each package is then tested for its impact on system performance. We measure the effect on everything from startup times to shutdown times to how long it takes to encode a video file. From this, we derive a performance impact score, again shown at the bottom of each review, along with the time it takes for the software to perform scans once installed.

The final ingredient is usability, where we check for the extra options on offer and how easy the interface is to understand (or otherwise).

How to use Microsoft's secret tool for protecting Windows: the Enhanced Mitigation Experience Toolkit

WANT TO PROTECT AGAINST ZERO-DAY EXPLOITS IN SOFTWARE? MICROSOFT'S FREE TOOL SERIOUSLY REDUCES THE RISKS OF A SUCCESSFUL ATTACK

Hackers love security holes in software. If they can make a program do something it's not meant to, or cause it to crash in a particular way, then they can inject their own code and gain remote access to the system.

One way to protect yourself is to ensure every single software program on your computers is fully patched against all known problems. An admirable ambition, but not always possible. Besides which, new holes are found all the time, and there's always a period between the hole being found and a fix being provided.

This is where Microsoft's Enhanced Mitigation Experience Toolkit (EMET) comes in. It doesn't know about each specific hole but it does recognise the common techniques used to exploit systems. It then foils these attacks in a variety of ways.

For example, Windows includes a protection mechanism called Data Execution Prevention (DEP), which ensures that programs use memory safely. If they don't, DEP terminates the program. Windows has supported DEP for years, but there's always been a problem: programs need to be specially compiled to support DEP.

With EMET installed, you don't need the developers of your favourite apps to rebuild them with security in mind, and you can continue to use old apps that were created before DEP was available. How? Essentially, EMET makes DEP available to applications that you "opt in". (If you find they start crashing you can turn off DEP, or one of the other types of protection, on an application-by-application basis.)

As another example, consider the various news stories about software that handles SSL certificates in insecure ways; the latest, at the time of writing, is Dell's inclusion of a trusted root certificate and private key on new PCs (see Jon Honeyball's column on p100).

This puts affected computers at risk of man-in-the-middle attacks, whereby an attacker can set up a fake banking website, for example, and your web browser will be fooled into thinking that

it's the right one: you'll still see green address bars, padlocks and all the other things that are supposed to reassure us that we're logging in to a trusted system. EMET includes a feature that lets you verify whether certificates for specific domains are legitimate.

So, you should think of EMET as an extra layer of protection to complement your other measures: running Windows Update and installing a good anti-malware program is normally sufficient to protect a PC, and many anti-malware products do include anti-exploit technologies.

However, EMET is free, doesn't add much load to the system and further reduces the risk of malware infection and more targeted attacks. Zero-day exploits – where no patches are available by definition – do exist, and serious attackers will try to discover which anti-malware products their victims use. They can then use a variety of techniques to bypass specific versions. Adding EMET makes things harder for attackers without making your life much more complicated.

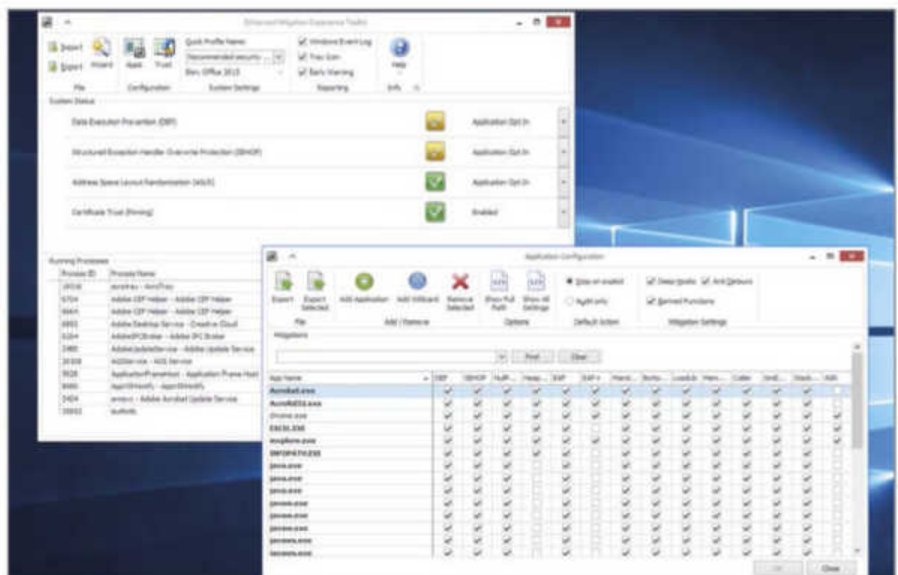
By default, EMET will protect a common set of Microsoft and third-party applications. For example, Microsoft Office, Adobe Java and Acrobat Reader

are set up to be protected from the start. You'll need to add protection to other applications yourself and we'll show you how to do that opposite. Bear in mind that protection isn't applied to new applications until you restart them. If you want to protect a load of them in bulk it may be quicker to restart your computer once you've added them to EMET.

We admit that EMET looks quite confusing to new users. As you can see from the screenshots here, the interface is fairly unfriendly with options such as "Structured Exception Handler Overwrite Protection" and "Mandatory Address Space Layout Randomization". Luckily there are profiles that you can use and customise at a later date if you need.

At first, keep with the recommended settings and pay attention to your system. If some applications seem to crash more often, you could play with its settings in EMET. For example, we found an older version of Adobe Illustrator behaved very strangely when protected but started behaving again when not. As with all things in security, there's a balance between protection and usability.

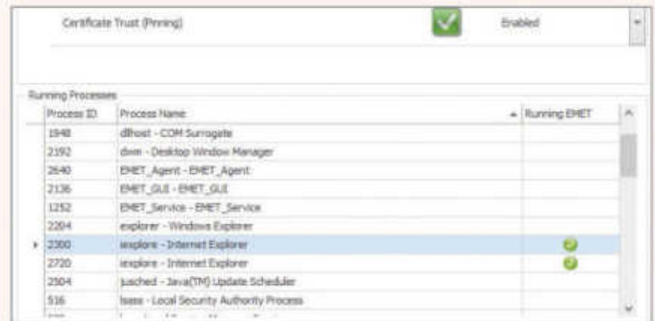
✓ The EMET interface isn't the most friendly, but once set up, it's hassle-free



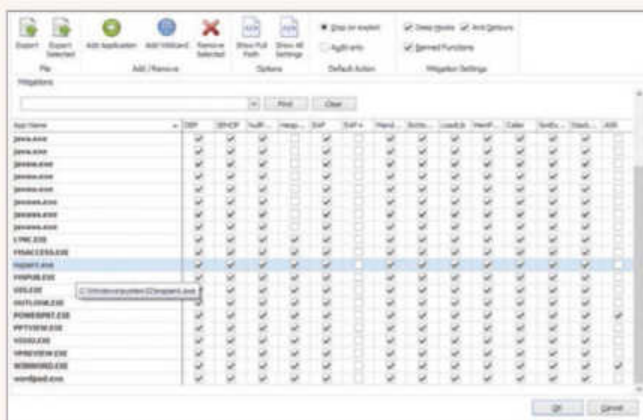
HOW TO SET UP EMET



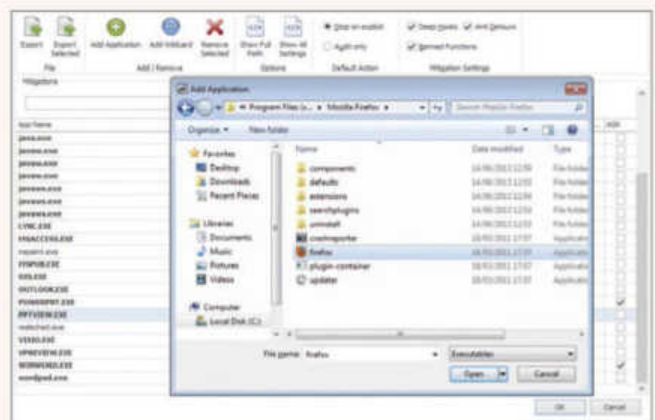
1 Download EMET from Microsoft's website (technet.microsoft.com/en-us/security). On installation, you'll be asked to use the recommended settings or keep existing settings. If this is your first time with EMET, use the recommended settings. After it has installed, you won't see much evidence of it. You'll find EMET lurking in the notification area (a black padlock against a grey background). Double-click the icon to open the program and change settings. At the bottom of the window you should see a list of running processes.



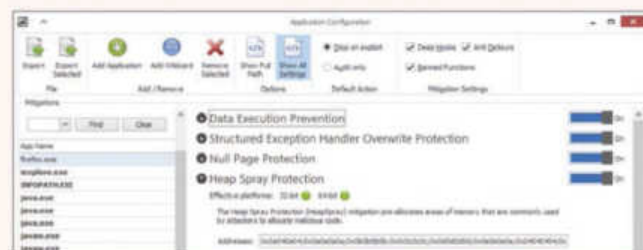
2 Run a common Microsoft program – say, Excel – and check the Running Processes window. You should now see the application listed with a green tick in the column entitled Running EMET. Initially there won't be many green ticks in the list, but you can sort that out later by adding other applications. If you see Microsoft Office applications running without protection, try restarting them. Anything that was running when you installed EMET won't be protected until they've been restarted.



3 One way to add EMET protection to an application is to run that application and then right-click its entry in the Running Processes list. Choose the Configure Process option that appears and you'll see a rather repulsive grid of applications and mitigation techniques listed by their acronyms (such as DEP). Your new application should be highlighted and, unless you know what you're doing, your next job is to click OK. This will provide EMET protection to the application once it's restarted.



4 You may prefer to add applications to EMET without first running them, which could be a good idea if you're worried about being attacked. If so, click the Apps button on EMET's toolbar and then choose the Add Application option. You can then browse through your PC for the programs you want to add and click on the appropriate executable files. You'll have a chance to configure things further, as in step three, should you wish to get involved with the details.



5 If you really want to play around, then click the Show All Settings button to see a large number of complicated-looking words and switches. You can also decide whether or not to kill applications if they behave weirdly (as they would when attacked) or simply to log the occasion. To switch into logging mode, click the "Audit only" radio button on the toolbar. If programs start crashing, you can remove applications by clicking Remove Selected.



6 Once things are set up, you can export your application configurations and reuse them on other systems, or simply back them up so you don't have to reconfigure your computer should you need to reinstall it. Click Export on the main interface's toolbar to dump the entire set of rules. The final step: if you don't want to send alerts and memory dumps to Microsoft, uncheck the Early Warning option on the right of the same toolbar.

				RECOMMENDED	
	Avast Free Antivirus 2016	AVG AntiVirus Free	BullGuard Internet Security	Eset Smart Security 9	
OVERALL	★★★★☆	★★★★☆	★★★★☆	★★★★☆	
OS DETAILS					
Desktop OS support	Windows 10/8/7/Vista/XP	Windows 10/8/7/Vista/XP; OS X	Windows 10/8/7/Vista/XP	Windows 10/8/7/Vista/XP	
Mobile app	Android	Android; iOS	Android	Android	
PURCHASE INFORMATION					
Free version	✓	✓	60-day trial	One-month free trial	
Price	Free	Free	\$36	\$90	
Devices protected	Unlimited	Unlimited	3 PCs	3 PCs	
Website	avast.com	free.avg.com	bullguard.com	eset.com.au	
FEATURES					
Antivirus	✓	✓	✓	✓	
Firewall	✗	✗	✓	✓	
Parental controls	✗	✓	✓	✓	
PC cleaning	✗	✓	✓	✗	
Email protection	✗	✓	✓	✓	
Gaming mode	✓	✓	✓	✓	
Remote management	✗	✓	✗	✓	
Anti-spam	✗	✗	✓	✓	
Secure browser	✗	✗	✗	✓	
Anti-theft (laptops)	✗	✗	✗	✓	
Rescue media creation	✗	✗	✗	✗	
File shredder	✗	✗	✗	✗	
Link protection	✓	✓	✓	✓	
Password manager	✓	✗	✗	✗	
Online backup	✗	✗	✓	✗	

Test results

For a full guide to the way we test security software, turn to p60. Here we provide a synopsis of the results, along with a brief guide to what they mean.

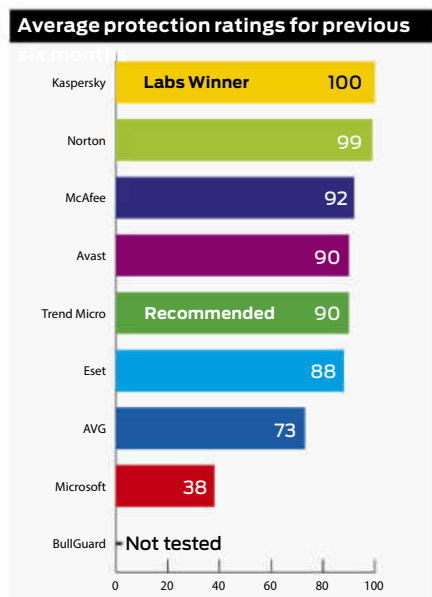
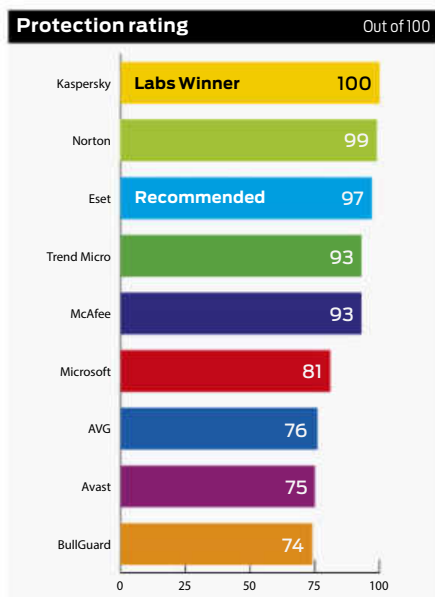
PROTECTION RATING: A weighted score, out of 100, to show how each product scores in our anti-malware tests.

AVERAGE PROTECTION RATINGS: The aggregate score over the previous tests. This gives a good guide to consistency.

PERFORMANCE IMPACT: A calculated guide to how each product will affect your PC's speed. It includes formal benchmarking, file-copy tests, startup/shutdown times, and how much disk space is consumed.

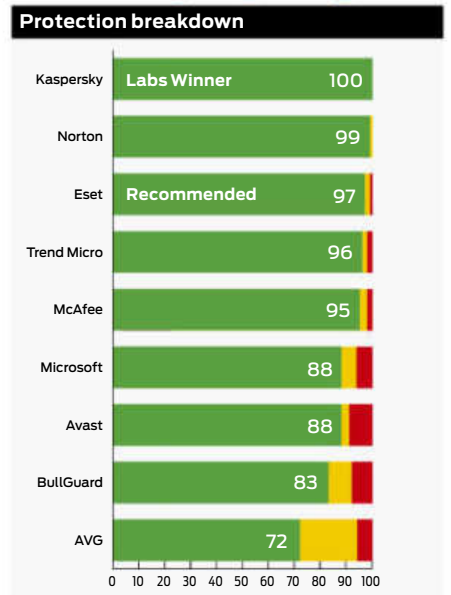
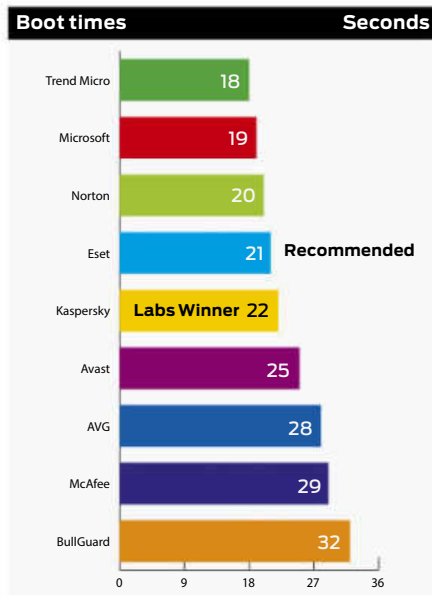
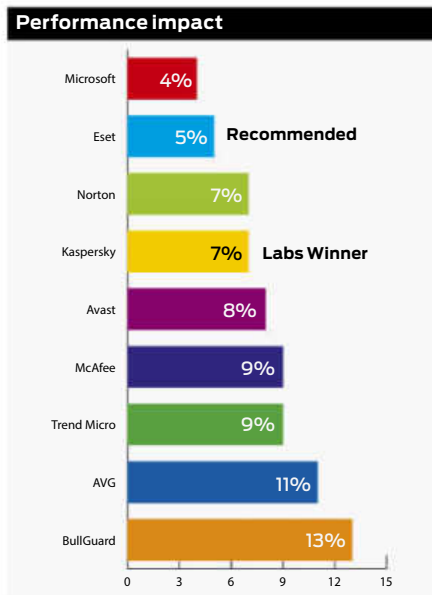
BOOT TIMES: in seconds, how long it takes a PC to fully load Windows 7.

PROTECTION BREAKDOWN: detailed analysis of how each product handled the 100 threats we sent its way.



LABS WINNER					
Kaspersky Total Security Multi-Device	McAfee Internet Security	Microsoft Security Essentials	Norton Internet Security Premium	Trend Micro Maximum Security 10	
★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆	
Windows 10/8/7/Vista/XP; OS X 10.8+	Windows 10/8/7/Vista/XP; OS X 10.7+	Windows 7/Vista	Windows 10/8/7/Vista/XP; OS X 10.9+	Windows 10/8/7/Vista/XP	
Android	Android; iOS	✗	Android; iOS	Android; iOS	
One-month free trial	30-day trial	✓	30-day trial	30-day trial	
\$119	\$75	Free	\$200	\$80	
3 PCs	Unlimited	Unlimited	10 devices	4 devices	
kaspersky.com.au	home.mcafee.com	windows.microsoft.com	norton.com.au	trendmicro.com.au	
✓	✓	✓	✓	✓	
✓	✓	✗	✓	✓	
✓	✓	✗	✓	✓	
✓	✓	✗	✓	✓	
✓	✗	✗	✓	✓	
✓	✓	✗	✓	✓	
✓	✗	✗	✓	✗	
✓	✓	✗	✓	✓	
✓	✓	✗	✓	✓	
✗	✗	✗	✓	✗	
✗	✗	✗	✓	✓	
✓	✓	✗	✗	✓	
✓	✓	✗	✓	✓	
✓	✓	✗	✗	✓	
✓	✗	✗	✓	✗	

Blocked Neutralised Compromised



Eset Smart Security 9

A GOOD CHOICE FOR TECHIE USERS, WITH EXCELLENT VIRUS DETECTION, BUT ITS ACE CARD IS ANTI-THEFT PROTECTION

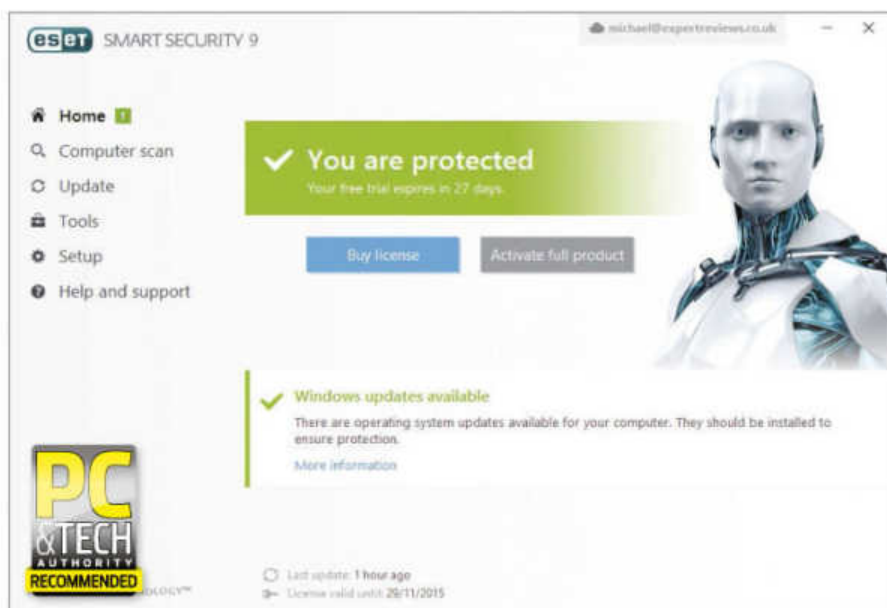
Consistency: it's one of the key characteristics we look for in virus protection, and Eset has every reason to be proud of its record. For five security suite Labs on the trot, it's either won awards, or been a whisker away. This success is based on its antivirus engine NOD32. You can buy this on its own for \$39.95 (one PC, one year), but that's not great value – just one reason why this review concentrates on the excellent Eset Smart Security suite, which complements the core engine with a few brilliant additions.

We're particular fans of the anti-theft tool, which you can activate on all licensed PCs (and mobile devices if you opt for Eset Multi-Device). It even offers a "phantom" Windows login designed to tempt thieves to log in to the fake account.

If your laptop is stolen, you can log in to your Eset account online and mark it as missing. After a few minutes, assuming your laptop is online at the time, you'll receive a snapshot of results: a Google Map showing where your system is, a screenshot of the active desktop, and a grab from your device's webcam, if you have one. We put the system to the test, and sure enough it deduced roughly where the "stolen" device was, using Wi-Fi triangulation as our laptop didn't have a GPS chip. Not entirely accurately – it was one building away – but it's a good start.

There's extra protection for banking and online retail sites as well. If you use Firefox, Chrome or Internet Explorer (Edge isn't currently supported, something Eset has in common with virtually every other vendor), then a secure, sandboxed version of the browser should automatically load when it detects you're visiting a bank or shopping site. We say "should" because this didn't work for us on HSBC. You can add or remove sites, but by default it depends on a list created by Eset.

The other extra features of note are parental controls (relatively basic, allowing you to monitor your children's computer use and block specific sites and categories) and a firewall that cloaks your identity if you're using a public hotspot.



When it came to testing, Eset excelled, managing an overall protection score of 97%. It was able to completely defend against 97 of the 100 attacks we sent its way, and it neutralised two more, allowing them to run but preventing them from damaging our test system. Its only blemish was a single piece of malware that was left to run unhindered,

"Only one piece of malware was left to run unhindered – in practice, it's very unlikely a threat will creep past your defences"

making it the third-best protector behind Kaspersky and Norton. In practice, it's very unlikely that a threat will creep past your defences.

If you're the type of person who likes to dig a bit deeper, Eset offers plenty of tools. For example, there's a list of running processes and their security reputation, while SysInspector provides all the information you could want about your system. There are log files for you to delve into, statistics galore and a network connection tool. Plus if you get irritated by the amount of notifications, or want more, you can delve into the settings. This is a piece of software for enthusiasts.

It also managed a perfect legitimate software rating, allowing us to run and install software without plaguing us with warnings or blocking us from doing so.

Such unobtrusive behaviour continued on to our performance tests: adding

▲ If you dig into the options, there are plenty of features for enthusiasts

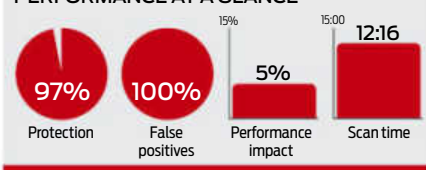
Eset barely affected the boot time of our system, taking it from 17 seconds to 18 seconds. It was rather more leisurely when it came to its first system scan, taking more than 14 minutes on our relatively empty test system. Subsequent scans were similarly slow at 12mins 16secs; Eset is nothing if not thorough. After all, some rivals finished scans in less than a minute.

We'd rather Eset's approach than a heavy system footprint, though, and again Smart Security impressed: we measured its performance impact at 5%, which is second only to the svelte Microsoft Security Essentials.

There really aren't any technical downsides to Eset Smart Security 9. Compared to Kaspersky, the most similar suite in terms of techie-appeal, it's a few dollars cheaper, too and there's very little to pick between these two winning security products.

Eset also earns a Recommended award for the anti-theft tool. Think of it as insurance and shapes up as very good value for money.

PERFORMANCE AT A GLANCE



KEY SPECS

3PCs/1yr, \$90 · www.eset.com.au

OVERALL



ON SALE NOW

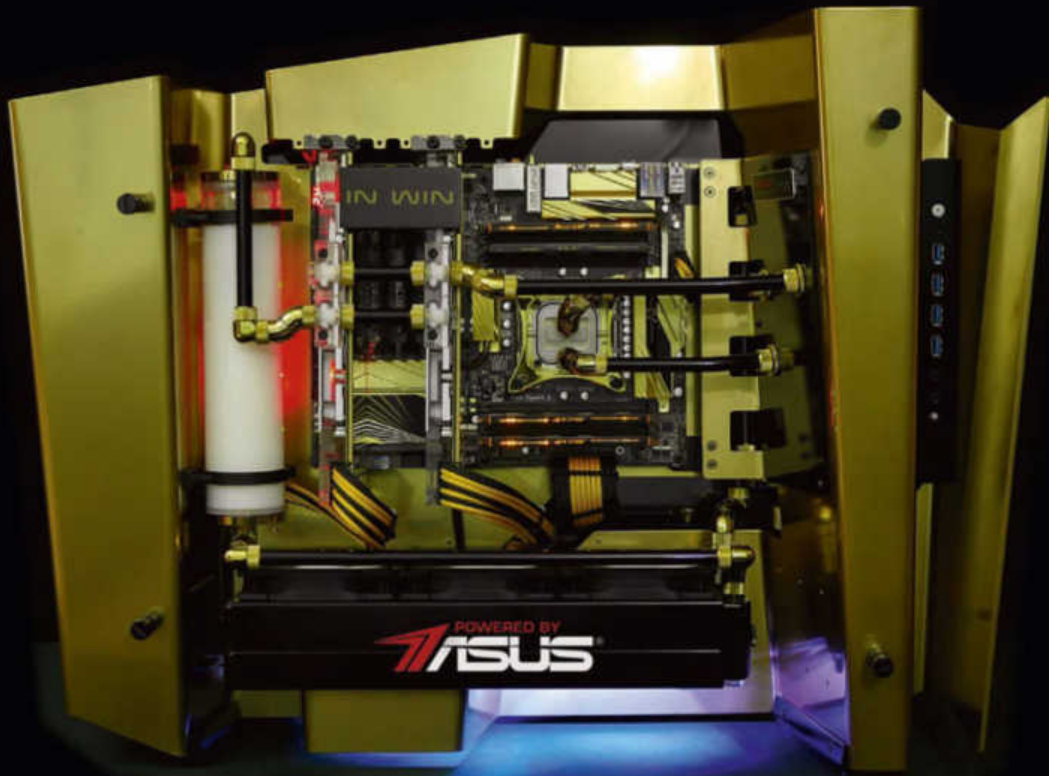
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OVERCLOCKING HOW TO SQUEEZE OUT THAT EXTRA SPEED

AUSTRALIA'S **PC GAMING MAG**

PC PowerPlay

Technical Handbook



PERFORMANCE TWEAKING

ARE BACKGROUND SERVICES
STEALING YOUR CYCLES?

PROFESSIONAL GAMING

DO YOU HAVE WHAT IT
TAKES TO MAKE IT?

PERFECT YOUR PC

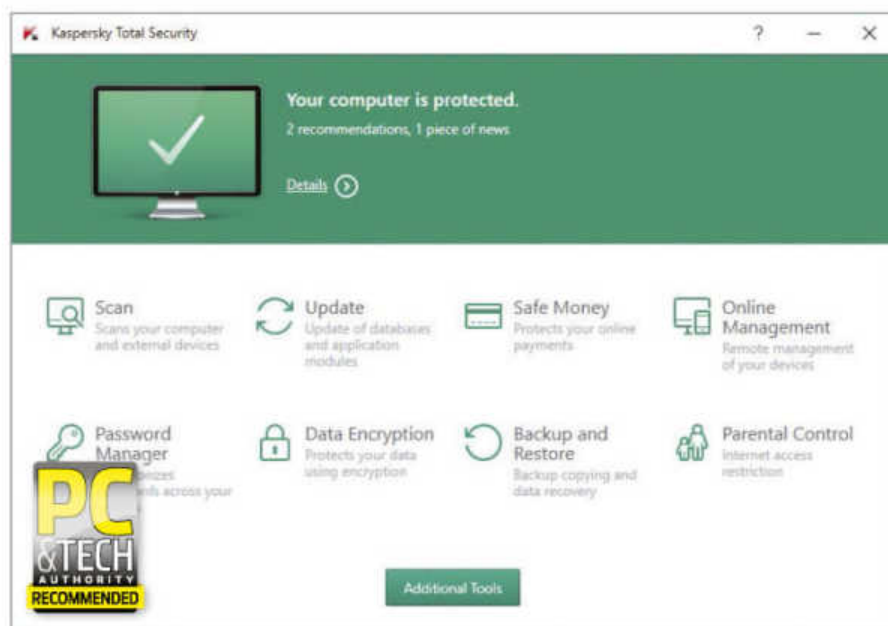
EVERYTHING YOU NEED TO
KNOW TO GET THE MOST OUT
OF YOUR GAMING RIG



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Kaspersky Total Security Multi-Device

PERFECT PROTECTION SCORES AND LOTS OF EXTRA FEATURES MAKE KASPERSKY TOTAL SECURITY FANTASTIC VALUE



If this was the World Cup, Kaspersky would be taking the trophy home. It's now taken top spot in our annual security suites Labs for three years in a row, each time thanks to a mix of near-flawless protection, great features and incredibly low prices. The exact same mix that wins it the Labs Winner award this time around.

One thing Kaspersky doesn't excel at is a clear product line. Head to kaspersky.com.au and you'll see a bewildering array of options: Anti-Virus 2016, Internet Security 2016, Internet Security Multi-Device 2016 and Total Security Multi-Device 2016. It's tempting to close your eyes and choose randomly, but there are a few key differences you need to understand.

As its name suggests, Kaspersky Anti-Virus concentrates purely on protecting against viruses and spyware, with no bonus features. The bump up to Internet Security adds parental controls and Safe Money, to check whether a banking or online shopping site is secure before you start entering details. Here we're going to concentrate on Kaspersky's top-end choice: Total Security Multi-Device.

And when Kaspersky says total, it means it. There's no facet of online security we can think of that hasn't been covered here. For example, Total Security not only includes the basic parental controls built into the main security software – these include an adult website filter and settings that can limit how long your child browses online during weekdays and weekends – but also a licence for Safe Kids, Kaspersky's separate parental controls application. This can give you their phone's location and monitor all communications –

“Kaspersky was the only product on test able to achieve a perfect protection rating, halting 100% of our attack”

including SMS and calls on Android devices. The Total package includes the Android app too. It's most useful when your device is missing, with the ability to wipe your device remotely, take snapshots from the front-facing camera, track it down to its location and sound an alarm, which is ideal if you know it's in the house somewhere. There's also an antivirus scanner, a boon if you download apps away from Google Play.

The extras don't stop there. A password manager integrates into Chrome, Firefox and Internet Explorer (Edge isn't yet supported), while Kaspersky aims to protect your files by offering local and online backup, plus encryption. There's a handy file shredder, too, plus a tool for creating a bootable rescue disk.

Total Security's final feature of note is remote management of Windows PCs and laptops, with a web-based interface that lets you run scans and enable features on the other machine. But it doesn't extend further than that.

Oh, and there's one other thing Kaspersky does: protect your computer from viruses. As ever, it does so brilliantly. This was the only product on test to achieve a perfect protection rating, halting 100% of our attacks. Unlike most antivirus software, which sometimes let a threat run before neutralising it, Kaspersky didn't even let them get that far; all 100 threats

There's no facet of online security that goes uncovered here

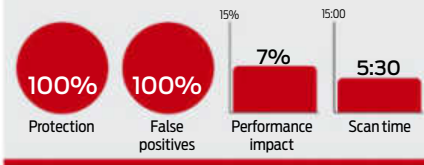
were dealt with before running.

Despite catching all of our malware, Kaspersky wasn't at all onerous when it came to blocking legitimate software: it allowed us to run all the programs we tried to install on our test PC.

The only real downside is the 800MB of space it demands. If you're using a netbook with only 32GB of built-in storage, that could be a problem. Our test system also booted five seconds slower than it would have without any antivirus installed, which all contributed to our 7% impact rating for the software. Despite this, though, in day-to-day use it's actually quite lightweight, and we doubt you'll notice any performance issues.

Kaspersky Total Security is the only security package on test that achieved both perfect protection and false-positives scores. That in itself is impressive, but factor in the small system footprint and excellent price – not to mention the anti-theft tools for phones – and it's obvious why it remains top dog.

PERFORMANCE AT A GLANCE



KEY SPECS

3PCs/1yr, \$119 · www.buykaspersky.com.au

OVERALL



Norton Internet Security Premium

PROVIDES GREAT PROTECTION AND FEATURES, AS WE'D EXPECT FROM NORTON, BUT NOTE THE SUBSCRIPTION MODEL

In past years, navigating Norton's product options hasn't been easy. Norton 360 or Norton Security, how do you decide? Thankfully, the company has now simplified its line-up with three clearly delineated choices: Norton Security Standard, Deluxe and Premium.

But hold on, because there is a catch. Rather than paying for a one-year licence, you're signing up for an annual, recurring subscription. There are advantages to auto-renewal – so long as your card details remain valid, you don't need to worry about protection – but take note of exactly what you're signing up for.

We suspect the Standard version won't suit most PC & Tech Authority readers, because it only covers one PC or Mac. Deluxe covers up to five devices – whether that's PCs, Macs, phones or tablets – while Premium doubles that number to ten. In addition, Premium includes automatic backups of "photos, financial files and other important documents of your choice on your Windows PC", with 25GB of cloud storage provided.

Whatever you think of the subscription model, you won't be disappointed by the level of protection on offer. We've come to expect outstanding performance from Norton products in our annual tests, and this year is no different.

On Windows PCs, it achieved a near-perfect score, just a fraction behind Kaspersky. It only lost points for allowing a potential threat to run before neutralising it – even then, the threat couldn't cause any damage.

Norton was also steadfast when it came to the installation of legitimate software: at no point did it pop up unnecessary warnings about risky software – it just let us get on with it. This points to software that won't be a pain to live with, which is especially important when it's installed on multiple computers.

We were also pleased to see that it

won't add much to your PC's overheads. Sure, it takes up 393MB of disk space, but compared to rivals that's comparatively lightweight. You should expect a slight increase in system startup time – our test PC increased from 17 seconds to 20 seconds with Norton installed – but

"Norton Security is as good as it ever was, with top-ranking protection, a small system footprint and decent extra tools"

that's the price you pay for increased protection. Its scans are pretty quick, too: our first system scan took a little over nine minutes, while a subsequent scan was completed in just over two. With all the other numbers crunched, we awarded Norton Security an overall system impact rating of 7%, which puts it in third position behind Eset and Microsoft.

So, what else do you get apart from protection? The Standard package provides extra tools we've become familiar with, including a password and financial information manager, a password generator and a toolbar for your browser (if you choose to install it) that provides an additional layer of protection when browsing the web.

There are also system performance tools that let you easily view the programs that run on startup, ranking them in terms of performance impact. While no different than Windows' own built-in startup tools, you can delay applications' startup for five minutes. A space-saving file cleanup tool rounds up the standard extras.

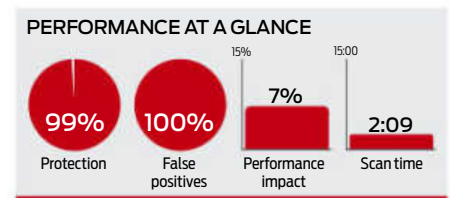
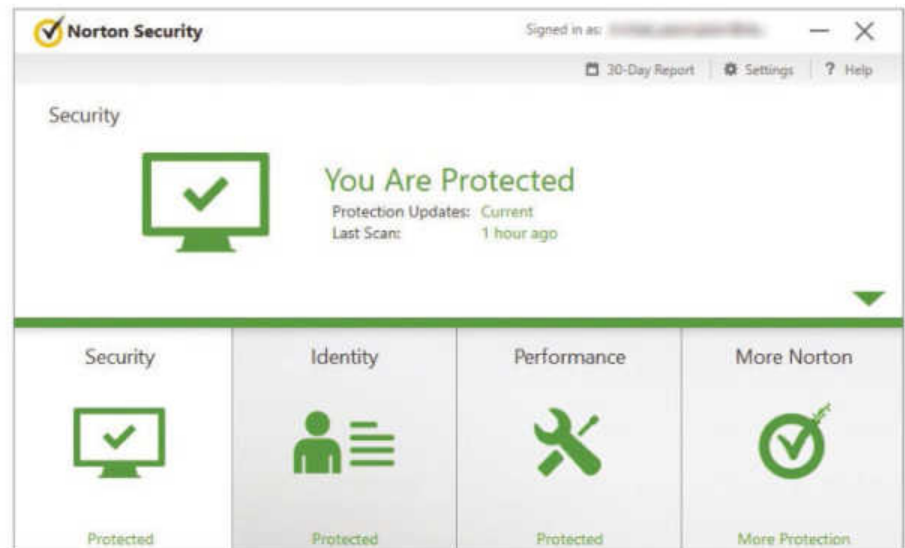
Paying for Deluxe or Premium gives you access to Norton's Android and iOS apps,

▲ A low false-positives score means Norton won't be a pain to live with

which don't include antivirus protection. Instead, there's a basic (and slightly unnecessary) contacts backup option, and a more useful anti-theft feature. This includes a "scream" alarm you can trigger if you can't find your phone or tablet, but frankly we don't see much advantage over Apple's own Find My iPhone service.

Premium also includes Norton Family, a surprisingly powerful tool. It lets you set rules and monitor your children's online activity on both PCs and Android phones. It runs separately to Norton Security, monitoring web activity, watching for flagged phrases such as credit-card numbers and letting you monitor where your child is via GPS. The GPS feature worked brilliantly: we could lock on to our test phone's location instantly, a feature that worried parents will appreciate.

Norton Security is as good as it ever was, with top-ranking protection, a small system footprint and decent extra tools. If you only have five devices to protect then Kaspersky is better value, but things turn around if you're in charge of up to ten. Take careful note of that auto-renewing subscription, though.



KEY SPECS

10 devices, \$200 · www.norton.com.au

OVERALL



THE FREE CONTENDERS: WHICH IS BEST?

Avast Free AntiVirus 2016

AVAST IS A REASSURINGLY CONSISTENT PERFORMER, DESPITE A HICCUP IN THE LATEST ROUND OF TESTING

Avast is the world's most popular antivirus company, according to data-tracking firm OPSWAT, and you only need to glance at its recent protection scores to see why. For the past two years, it's consistently been the strongest free performer, often challenging rivals such as Norton in terms of threat detection; it's usually able to peer down from its lofty position near the top of the table, while Microsoft Security Essentials has wallowed in last place.

Not so this time around, with Avast scoring unusually poorly in our tests while Microsoft flourished. Of the 100 threats we exposed Avast to, it blocked 88 and neutralised a further three before they were able to cause damage. That left nine threats able to compromise our PC, giving Avast the lowest score in this round of testing. We'd expect and hope Avast will score better next time around.

It performed much better in our legitimate software tests, only blocking the installation of one, but we did find an impact on system performance: for example, boot times increased from 17 seconds to 25 seconds and file-copy times went from 13 seconds to 32 seconds. Likewise it proved a greedy consumer of hard disk space, swallowing 1.6GB all told.

More importantly to most people, though, day-to-day speed isn't too badly affected, with smaller tasks only taking a fraction longer than they would have without the software installed.

It also wins for design. Avast has one of the simplest interfaces around, with a friendly homescreen declaring "You are protected" on installation. You're then prompted to run a Smart Scan, which will

check for viruses and potential problems such as outdated software and browser add-ons with a poor reputation.

We were impressed by how easy it was to resolve issues with out-of-date software and add-ons. You simply press a button next to the flagged item and Avast's software updater does the rest. And it's all done free of charge. The only sign that Avast is still keen on grabbing your money is the notice saying "Tired of manual updates?" while the fix is taking

"It's still our pick of the crop if you don't want to pay for antivirus protection."

place; press this and you're taken to an upgrade screen where the benefits of Avast Premier, a \$70 annual subscription, are heavily promoted.

It's a slightly more aggressive story if you want to deal with the "performance issues" that Avast's scan will inevitably find. This time you're prompted to pay for Avast's "PC optimization tool", which costs \$45 per year. We weren't tempted.

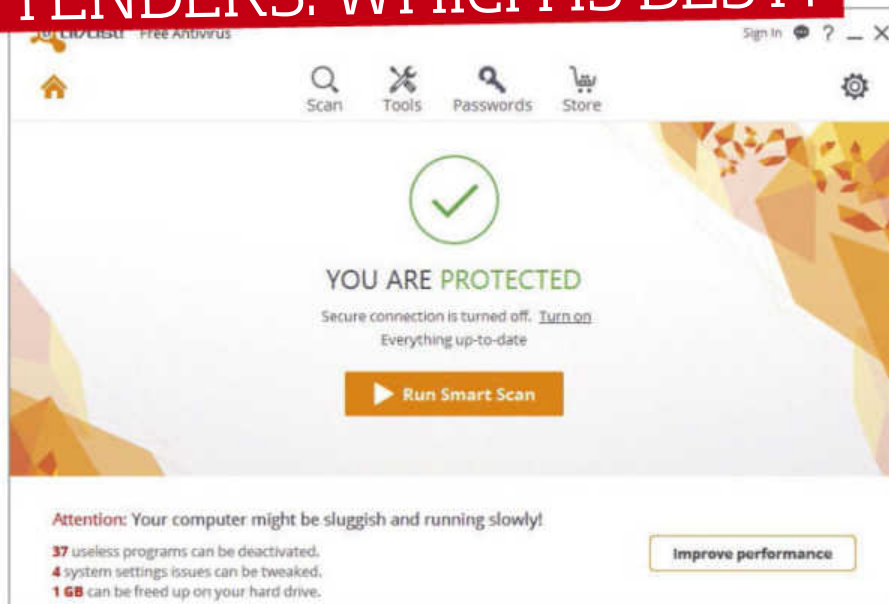
Still, such nags are to be expected in free antivirus software, and Avast has been surprisingly generous by also bundling a password tool. We can't see any obvious benefit over free alternatives such as LastPass, but it's a commendable inclusion that's seamlessly integrated into the homescreen and, as we'd expect from Avast, it's easy to set up and use. If it encourages more people to use stronger passwords, and keep them locked down,

then that has to be a good thing. Kudos to Avast for bundling, free of charge, a tool we associate with paid-for suites.

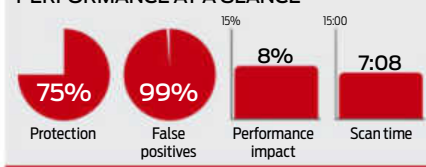
Likewise it's great to see a free rescue-disk tool and remote assistance built in: if you look after other people's computers, and both computers have Avast installed, you can just plug in the auto-generated eight-digit code to see and control their desktop. There is a slight lag, but that's only to be expected.

Dig deeper into the settings and you'll find options to enable a "hardened mode", which could be tempting on family computers. Choose the "aggressive" option and only programs on Avast's whitelist will be installed, which could be the difference between a virus or not.

We're not saying Avast is perfect. We were disappointed by its performance figures this month, and naturally you do get the occasional nag to upgrade. However, we're reassured by its long-term performance, and we love its surprising depth of features for a free product. It's still our pick of the crop if you don't want to pay for antivirus protection.



PERFORMANCE AT A GLANCE



KEY SPECS

\$FREE · www.avast.com

OVERALL



AVG AntiVirus Free

SOLID BUT UNEXCEPTIONAL PROTECTION LEAVE AVG LAGGING BEHIND ITS FREE RIVALS, WITH NO STANDOUT FEATURES

AVG beat Avast in our protection tests this time around, blocking 72 of the 100 attacks and neutralising a further 22 after they had started running. Six more attacks were able to run uninterrupted. It's an unusual score: none of the other suites on test allowed so many viruses to run before eliminating them.

It only stopped us installing a legitimate piece of software on one occasion, but we were irritated that it halted the installation without telling

us. You can't call AVG svelte, either. It took up a full 973MB of space on our test PC, and slowed system startup from 17 seconds to 28 seconds. Even worse, our 1.8GB file-copy benchmark took 40 seconds, more than three times longer than a PC with no antivirus installed, and eight seconds more than Avast.

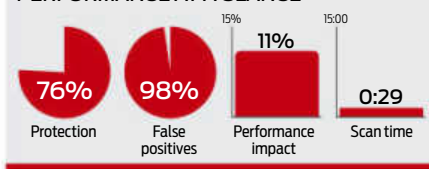
Confusingly, AVG Free breaks down into two separate programs that operate almost identically. A button in the main program takes you to AVG Zen, which acts as a management interface for other devices you've registered with AVG. This is a potentially great tool, but we don't understand why it's installed by default.

AVG's main menu has five clear sections: Computer, Web, Identity, Email and Firewall (which is paid-for), each one with coloured circles showing your "progress" towards fully protecting yourself in each area. To fully fill the "Computer" progress bar, for example, you have to pay for AVG Pro and enable

Data Safe, a file-encryption tool. An email scanner is included with the free package, which automatically installs itself into Microsoft Outlook and adds "Scanned by AVG" footer to every email you receive.

Although we can see the merits of Zen for overseeing a network of computers and devices, Avast nudges ahead for ease of use and bundled features.

PERFORMANCE AT A GLANCE



KEY SPECS

\$FREE · www.avg.com

OVERALL



Microsoft Security Essentials

AN EXCELLENT COMPROMISE BETWEEN SYSTEM IMPACT AND PROTECTION, ALTHOUGH THE LATTER ISN'T PROVEN OVER TIME

We haven't always been fans of Microsoft Security Essentials. Historically, it has combined minimal system impact (great) with very poor threat protection compared to its rivals (not so great). So its results this time around are something of a revelation, not quite banishing the ghosts of the past but still delivering low impact and great protection.

Well, great protection compared to what we've seen previously. It was the

✓ Slowly but surely Microsoft's free product gets a little better each year

sixth-best out of the nine products on test, successfully defending against 88 of our attacks and neutralising a further six before they could inflict damage.

That left six undetected viruses on our test PC, putting it on a par with AVG AntiVirus Free.

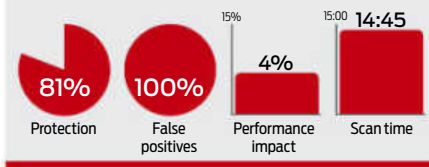
It remains an incredibly lightweight piece of software. It takes up only 279MB of disk space and barely affected our PC's boot time, going up by from 17secs to 19secs. Its scans are very slow, though, taking more than 14 minutes on our clean test PC, and they're CPU-intensive, too. Luckily, you can schedule scans so they don't interrupt you during the day.

Security Essentials didn't get in the way of any legitimate software, relying on the Windows SmartScreen Filter. Perhaps that shouldn't be surprising when you bear in mind how tightly Security Essentials is woven into Windows: indeed, it's effectively baked into Windows 8 and 10, silently launching into action if you don't install any other antivirus software.

It's only if you're running Vista or Windows 7 that you can download it as a separate tool.

We aren't going to recommend Security Essentials yet. Its performance over time is still very questionable, and one half-decent set of results doesn't a winner make. However, if you refuse to install anything else, then it does at last offer a sound level of protection. Security Essentials is finally living up to its name.

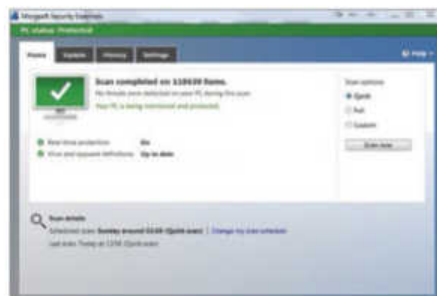
PERFORMANCE AT A GLANCE



KEY SPECS

\$FREE · windows.microsoft.com

OVERALL



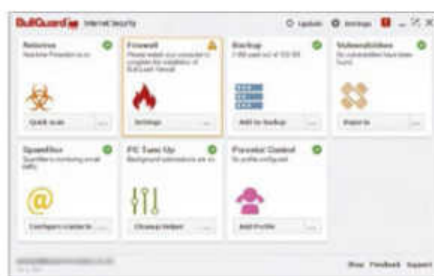
BullGuard Internet Security

SUB-PAR MALWARE PROTECTION AND RESOURCE-HEAVY SOFTWARE DON'T A DREAM COMBINATION MAKE

There's no way around it: BullGuard Internet Security's results were well below par. A protection rating of 74% meant it battled with Avast for last position. It successfully defended against 83 attacks, managing to neutralise a further nine before they could do any damage. That left eight pieces of malware on the loose.

To make matters worse, its system impact was the worst on test at 13%. It took up 1.2GB of disk space and added 15 seconds to our system's boot time. It also doubled the time it took to copy 1.8GB of test files, taking the operation from 13 seconds to 27 seconds.

It's a shame performance isn't up to scratch, because BullGuard is a highly configurable piece of software. The main screen is split into seven clearly labelled sections, each with a primary action (such as Quick Scan for the Antivirus menu) and a menu of secondary options (such as Full Scan and Scan Folder). It's easy to find the tools you'll use most often.



▲ The interface is well designed, letting you easily find your most-used tools

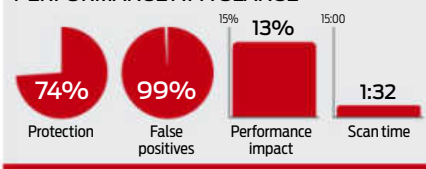
BullGuard also scans for out-of-date software and other known vulnerabilities and cleans up what it perceives to be junk files. We have to take issue with the latter: when BullGuard launches for the first time it immediately scans and cleans your system, and it decided to clean out all of our log files, temporary files and crash dumps, deleting more than 1GB of files without consultation, which is at a minimum annoying, and potentially a major issue.

Its parental controls are more sensible.

You can block website categories and specific URLs, while an easy-to-use scheduling tool controls the hours children are allowed to use the internet. You can also stop the transmission of specific number and text strings, such as credit-card numbers.

We like the design and features, but below-average protection scores, slow performance and a steep price are hardly the dream marriage.

PERFORMANCE AT A GLANCE



KEY SPECS

3PCs/lyr, \$36 · www.bullguard.com

OVERALL



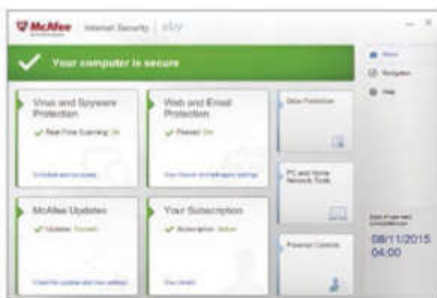
McAfee Internet Security

DECENT MALWARE PROTECTION, BUT IT'S BADLY LET DOWN BY DATED, RESOURCE-HOGGING SOFTWARE

Internet Security sits in the middle of McAfee's range, and offers all the basic features you'd expect from a Windows-based suite. Except, that is, for a well-designed interface. For example, the General Settings menu is a mess of buttons, with individual categories hiding on/off switches that make tweaking settings a real pain. Even worse, with no built-in help system, McAfee directs you to its support website to explain features and terminology.

At least the parental controls are well

▼ We aren't fans of the interface, and the help system simply sends you to the website



implemented, with age-based presets automatically assigning what's blocked for each age group. If your child is under five, say, McAfee blocks everything apart from websites it deems "kid-safe". If you choose 9-12, you'll unlock categories such as streaming websites, games and social networks. You can also add and remove categories manually, block specific domains and control times of access.

Elsewhere, you're given a junk-file cleaner and a file shredder for secure deletion of files you don't want anybody to be able to recover. The hefty price covers all the devices you own, including phones and tablets – but note the (excellent) mobile app is also available for free if you're willing to tolerate ads.

McAfee provides good but not great protection: it swatted away 95 of our 100 threats, managing to neutralise a further three attacks before they caused any damage. Two threats were allowed to run on the system with no intervention, which is disappointing for a paid-for suite.

McAfee also had a big impact on system performance. It blocked the

installation of two programs without any prompt or explanation, while it took up more than 1.1GB of disk space. What's more, Windows' boot time slowed from 17 seconds (for a PC with no antivirus software installed) to a lethargic 29 seconds. It also badly affected the time it took to copy a file from one folder to another; our 1.8GB of files took 32 seconds with it installed, 13 seconds without.

It adds up to an irritating package that we can't recommend.

PERFORMANCE AT A GLANCE



KEY SPECS

Unlimited devices/lyr, \$75 · home.mcafee.com

OVERALL



Trend Micro Maximum Security 10

DECENT PROTECTION AGAINST THREATS, BUT IT DOESN'T STAND OUT IN ANY DEPARTMENT

Trend Micro can claim one thing: its top-end security product has the best name going. It successfully defended 96 out of our 100 attacks, neutralising two more before they were able to wreak havoc. It did, however, allow two threats to run unabated, dragging its overall protection rating down to 93%.

It wolfed down almost 1GB of disk space, but only slowed our system boot time by one second. It made our PC significantly slower during scans, though,

✓ The Privacy part of the interface offers the most interesting options



with 1.8GB of files copied in 32 seconds compared to Norton's 21.

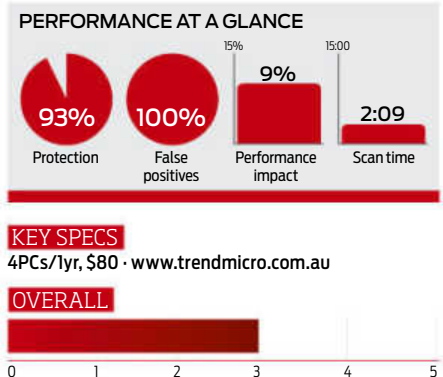
Sadly, the extra features are buried in annoying, animated menus. The interface is divided into four sections: Device, Privacy, Data and Family. Device lets you configure the anti-malware elements of the software, with options for both its real-time and scheduled scans.

The Privacy section has a privacy scanner that checks your social media feeds via a browser toolbar. It also checks browsers for privacy settings such as Do Not Track. There's a data-protection tool that's meant to prevent anyone typing in personal information, such as credit-card numbers, without a confirmation that it's really you. However, we sent credit-card numbers over WhatsApp and Facebook Messenger without Trend Micro so much as blinking.

The Data tab contains a file shredder and password manager, while Family lets you set up parental controls, including adult content filters, time limits on certain programs and the ability to generate

reports about what your children get up to online. The price also includes iOS and Android apps, but only the anti-theft feature on the Android app is particularly noteworthy. This lets you track a missing device and wipe it if all hope is lost.

Trend Micro Maximum Security is a decent suite with reasonable protection, but its slightly elevated price and so-so system performance mean it's not the most attractive option.



View from the Labs

DON'T BELIEVE IN ANTIVIRUS SOFTWARE? PC PRO EDITOR-IN-CHIEF **TIM DANTON** URGES YOU TO CHANGE YOUR MIND

It's curious just how laissez-faire an attitude some people have towards antivirus software. I'll always remember one member of the PC & Tech Authority staff – I'll protect his identity, even though he'd shrug his shoulders and say he didn't care – who actively resented installing it. "I don't go to dodgy websites or click on dodgy links," he'd say, "and I'm technically literate. I don't need it."

Just like the 80-year-old smoker who waves away the suggestion that smoking causes cancer, he existed in a one-person statistical group and that was enough for him. See no evidence directly affecting me, hear no evidence directly affecting me, as the monkeys might have said had they been just a little more loquacious.

It would be poetic justice to say that the very next day he was hit by a virus, but also a lie. To the best of my knowledge, he continues to exist in a virus-free, antivirus-software-free world. And it's certainly true that updating

and patching your computer will give you protection against an awful lot of attacks. So-called zero-day exploits, where the perpetrators know about the security flaw before anyone else, are a different matter – but hey, what are the

"Hassle is a big factor in the buying decision: if you're going to be annoyed by a product then it isn't worth installing"

chances of it happening to you?

Weighed against this question of security is its constant nemesis: convenience. One reason people give for not installing antivirus software is the performance hit it sometimes involves, and it's true that certain vendors don't exactly help quell this anxiety. During

this Labs, we've seen even simple tasks such as file-copying suffering badly. I'd say that hassle is almost as big a factor as protection when it comes to the buying decision: if you're going to be annoyed by a product then it isn't worth installing.

The good news is that the best products no longer come with that hit. All of our recommended offerings have a minimal effect on your machines and won't nag you to upgrade to this or consider buying that. And that includes one freebie, the vastly improved Microsoft Security Essentials, which would be winning this season's Most Improved Player if it were human. And a basketball player.

Whichever of the recommended products you choose, you should be happy with the results. Please, though, I urge you: no matter how technically literate you are, no matter if you've avoided clicking on virus-ridden links for all your previous online life, install one of these products. ●



UPGRADE AUSTRALIA IS COMING TO MELBOURNE **BUILD. PLAY. CREATE**

APRIL 13TH AT MONASH UNIVERSITY, CAULFIELD CAMPUS

BUILD

- Witness the newest PC hardware in action
- Get hands-on with a huge range of PC gear
- Speedbuilding returns!

PLAY

- The hottest new competitive games
- Play solo or against Australia's hottest Pro teams... and watch them annihilate each other
- Play better with exclusive tips from the pros

CREATE

- Learn how to use your PC as a powerful creative tool

PLUS! WIN COOL PRIZES AND SCORE SWEET FREEBIES

Note Upgrade Australia is an over-18s event

◦ Images on this page show previous Upgrade Australia events, and are not necessarily indicative of what we have in store for you at the Melbourne Upgrade Australia event.

Visit www.pcauthority.com.au/UpgradeAustralia

for more information, and stay tuned for when registrations opens



experience
what's inside

THE UPGRADE AUSTRALIA INTERVIEW

Graham Tucker is the ANZ Technical Manager for Intel, he chats with PCTA's David Hollingworth



GRAHAM WILL DELIVER A KEYNOTE SPEECH AT THE UPGRADE AUSTRALIA EVENT IN MELBOURNE ON APRIL 13TH!

We recently caught up with Intel's Graham Tucker - who'll be delivering the keynote speech at our next Upgrade event - to ask what he's excited about in the year ahead for Intel.

When we spoke to Graham, it really wasn't that long after CES, so one of the things getting him hyped about Intel's future was small form factor computing.

"At CES we were showing off NUCs with Core i7 processors, that can be used as real gaming machines," he told us. "That small form factor, with Iris Pro Graphics - sure it's not a discrete solution - but we've basically had a 30-year gain in performance over only five years, in terms of graphics. Iris Pro, with EDRAM, gives you the power envelope and the level of performance you need for gaming."

But will that power increase continue - can smaller form factors keep getting more powerful?

"Definitely," he responded. "We've just recently announced the Compute Stick with a 6th-gen Core M inside, so now we've got the power envelope down to 4.5 watts, it makes it viable to put into a Compute Stick."

"And it's been really interesting - people are excited about the Compute Stick. They ask 'Well, how am I going to use it?' but it's being used in some quite unusual ways.

For example, with gaming, you can stream games with Steam, becoming a Steam Box. Once you've got the power of the Core M it becomes a lot more viable to do much more meaningful stuff."

"NUCs in Australia have been very, very popular. I think this discussion about upgrading - and what this event is about - is just as applicable to home entertainment, for home theatre boxes using PLEX or whatever. It's a very low-power device compared to a desktop, so when you're leaving something like a home theatre system on, you can save a lot of money with a smaller device like NUC. And then you've got a lot of multi-system households, with gaming machines, the home theatre, even home gateways... it all adds up."

But Graham's also very passionate about the so-called death of the PC.

"We're very happy with the uptake of our more powerful K SKU desktop processors, and if you look at the figures - worldwide - there are still many more PC gamers than console gamers. There's a perception that console dominates, but the trajectory for PC gaming is still rising. Microsoft's DirectX 12 is really pushing that envelope. DX12 takes advantage of multithreading and multi-core CPUs; when you look at the K SKUs

processors, they have both multiple cores and threads, so you want something that can unlock all that."

Graham also thinks that it's builders who are really showing what the PC is capable of. "People think that we're in competition with graphics card manufacturers because of our own integrated graphics solution, but if you're buying a high-end graphics card, you're buying a powerful CPU to go with it - that helps us! But we do have a lead when it comes to the lower power solutions, and that's where we think we're doing exceptionally well."

"When you look at all the platforms, the PC is the only form factor that is really modular, where you can choose your own stuff and hardware to form whatever suits your own personality."

Of course, you can't talk for too long about computing trends in 2016 and not bring up the Internet of Things.

"Intel's looking more at moving into an expanded world of computing. The Internet of Things encompasses things like your watches and anything that connects to a computer. We've got our Curie processor, which is the size of a button - it fits into just about anything and is a very low-power unit. In fact it's coming in a developer board, the Genuino, and we're hoping to have some at the event. We know that your readership's really interested in the Maker scene, for people who just want to get into it really easily they can get one of these, download all the development tools - free - and start creating all kinds of inventions."

And that pretty much sums up what the next Upgrade Australia event is all about - building, playing, and creating. So watch this space - and keep an eye on www.pcauthority.com.au/UpgradeAustralia - for more on what you can expect from this exciting new Melbourne event happening on April 13th.



upgrade
AUSTRALIA 2.0



Acer Predator 17

FINALLY, A RELATIVELY QUIET GAMING LAPTOP

The Acer Predator 17 is an old-school gaming laptop; it's big, heavy, and mighty expensive. But it's also kick-arse fast, able to whip through The Witcher 3's highest settings without batting an eye-lid. In this era of ultra-portable, wannabe, gaming laptops that struggle to run Solitaire, it's refreshing to see Acer hark back to the old days. Yet it's not the only bruiser of a gaming machine around – how does it compare to other 17in behemoths?

There's no mistaking the Predator 17 for a laptop designed to run Excel, as its design simply screams game-ready. Bold red highlights and the red backlit keyboard combine with the glowing LED strips and logo on the exterior to let everybody know that this is a performance monster. The entire chassis is covered in that lovely rubbery paint that feels so nice to touch, which also hides the fact that it seems to be entirely plastic. The huge 17in display dominates the design, and is available up to 4K

resolution. Our sample had the standard 1920 x 1080 display, yet looked incredibly crisp for such a large display – we had to double check we hadn't been accidentally sent the 4K version. It's a beautiful IPS panel, with rich colours and stunning contrast. The matte finish also makes it easy to view under harsh lights. Given the huge size, it's no surprise that this thing is heavy, weighing in at just under 4kg, and that's without the brick of a power supply.

A full-sized keyboard comes replete with a set of macro keys on the left side, along with a full numpad. The Prozone software makes setting up macros a breeze, which can also be shared via profiles. The touchpad is a little twitchy, but nobody buys a gaming laptop to use the touchpad. The large size allows for plenty of outputs, starting with four USB 3.0 and a single 3.1. There's also HDMI and Displayport out, along with Killer's Doubleshot Pro Ethernet/Wi-Fi combination. An SD Card reader sits next to the mic in and headphone out ports, which all sit next to the DVD optical drive.

Acer highlights the Soundpound 4.2 speaker system in the marketing materials for this laptop, which sounds great on paper. Four speakers and two miniature subs combine with Dolby Audio to deliver "deep sound immersion". In reality, the performance of these speakers is rather disappointing; perhaps because they're so loud, there's quite a lot of distortion, as well as a rattling sound from something in the case.

Heading under the hood reveals high-

end hardware throughout. Intel's i7-6700HQ is a quad-cored HyperThreaded beast that runs at 2.6GHz while idling, with a maximum Turbo speed of 3.5GHz. Acer has wisely paired this with a whopping 32GB of DDR4 memory running at 2133MHz. Two separate hard drives handle long-term storage; a 256GB Hitachi SSD with 237GB of usable space, along with a large 1TB mechanical hard drive. Graphics duties are handled by Nvidia's excellent 4GB GeForce GTX 980M.

These specs all sound great, but it's worth pointing out the Metabox Prime P870DM-G that we reviewed last month. It's \$200 more expensive, but has a 4GHz desktop i7-6700K CPU that can be overclocked even faster, along with a true desktop GPU, the GeForce GTX 980. The only area where the Acer wins is in screen quality, as its IPS panel is noticeably superior. Therefore we benchmarked the Predator 17 against the Prime, and as expected, the Acer came off second best.

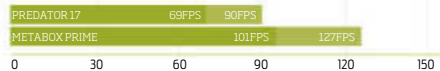
In Grid Autosport, the Predator trailed by 41%, a gap that increased in the more demanding Shadow of Mordor test by 58%. Our final test is the GPU-melting Metro Last Light benchmark, which we only roll out for serious gaming hardware. In this test, the Predator once again lagged behind the Metabox, but this time by a much smaller margin, at 22%. Yet there is one huge benefit to the Predator though, in the lack of fan noise. We measured a maximum of 47dB under load, which is substantially better than the annoying 55dB of the Metabox.

The Predator 17 has oodles of processing power, with more than enough to handle any triple-A release, but it's resoundingly beaten by the likes of the Metabox Prime. However, it's also a slightly better built machine with a nicer display, which doesn't sound like Bronwyn Bishop is landing in your back yard.

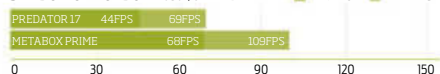
Bennett Ring

BENCHMARKS

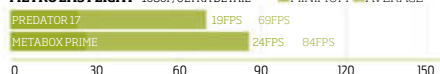
GRID AUTOSPORT - 1080P, ULTRA DETAIL



SHADOW OF MORDOR - 1080P, ULTRA DETAIL



METRO LAST LIGHT - 1080P, ULTRA DETAIL



KEY SPECS

\$4299 • www.acer.com.au

GeForce GTX 980 Ti GPU • 6GB GDDR5 onboard memory • 2 x 8-pin power plugs • 2.5 slot-wide cooler

OVERALL





Asus Strix Raid Dlx soundcard

ONLY FOR THE AUDIOPHILES

It's now possible to get onboard audio that doesn't sound as if you're listening to your PC via a tin can on a piece of strong, with quality solutions now included on all but the most affordable motherboards. Many would argue that thanks to the huge strides made in the quality of integrated motherboard audio over the last five years, there's simply no need for dedicated sound cards any more. We beg to differ; when matched with high-end headphones or expensive speaker systems, a discrete sound solution can deliver noticeable improvements in audio. Asus' new Strix Raid Dlx is one such product, but you're going to need some seriously good gear to make the most of it.

This is the flagship model in a range of three new soundcards from Asus that fall under the Strix gaming series banner. Unsurprisingly, it's got the best specifications of all three, not to mention a few extra features that help to justify the rather scary price tag. The key specification bandied about by all sound products is the Signal to Noise ratio, or SnR. The higher this is, the less base-line noise experienced by the card, such as hissing. Asus claims this card has an SnR of 124dB, which is identical to Creative's Sound Blaster ZxR, the only other gaming soundcard in this price range. This compares well with high-end onboard solutions, which tend to max out at 110dB.

Asus has accomplished this by using extremely high quality components throughout the Dlx's construction. At its heart is the ESS ES9016 D/A converter, which is also used on several Pioneer home theatre receivers. If it's good enough for Pioneer, it's good enough for us. A Cmedia CM6632AX handles the audio-processing, and its rated to deliver 384KHz/24bit audio, but the card is actually limited to 192KHz at 24bits.

The inside of a PC case is not a nice place for sound devices to live, as they're constantly bombarded by electromagnetic interference, not to mention the interference that comes from the soundcard's own power supply. To negate this, Asus has utilised a 4-layer PCB, which allows the power, analogue and digital circuitry of the card to be mounted on separate, individual layers. The top of the card is also covered in an eye-catching EMI-shield. Helping to further reduce interference from the card's power circuitry is the use of high-end power components, with the power supply regulated twice to ensure a stable, clean supply of electricity.

Headphone users will appreciate the inclusion of the Texas Instruments LME49600 headphone amplifier, which is used by some homebrew sound-card makers thanks to its high quality. This can power 600ohm headphones, and we'd argue that you'll need such good cans

to get the most out of this soundcard. Speaking of headphones, Asus employs its own virtual 7.1 headphone algorithm. As far as I/O options go, the rear of the card hosts the mic/line-in, headphone out, as well as three 3.5mm stereo minijacks for front/rear/centre. One final speaker output serves double duty, for either side speakers in a 7.1 configuration or S/PDIF out for those who want to power an AV receiver via optical. If you're planning on using this card to power an AV Receiver over the optical S/PDIF output, don't bother, as all of the audio processing will be handled by the receiver, not the soundcard. In this instance, you might as well simply use onboard audio.

Another output is used to connect an external control box, which can be used to bring the mic and headphone connections to the top of your desk. It also controls volume, and can switch between various sound modes supplied by the card, which are basically equaliser settings. The software that drives all this clear and easy to use, but has one huge omission – there's no LFE setting to control the cut-off point of external amps. This is a rather large problem if your sub doesn't have independent LFE controls, so hopefully Asus resolves it in future versions of the software.

We tested the card in two modes – headphones and external speakers. When using cheaper Audio Technica ATH-M50x headphones (\$180), we couldn't discern much of a difference between this soundcard and a high-end onboard audio solution. However, we then tried ATH-A900X headphones (\$350), and could definitely pick the Asus as having the crispest, clearest output. The difference was even more marked when using our external speakers, a set of Paradigm Monitor 5.1 with twin subs (approx. \$4000). With the onboard audio we could easily pick up background hiss, while the Asus card sounded crisp and clear.

While we still think the best audio solution is an external AV receiver with audio passed through the PC's HDMI port, the new Strix Raid Dlx comes very close to this quality, without having to use an external box. Just bear in mind that there's no point in pairing this expensive sound device with cheaper audio output solutions.

Bennett Ring

KEY SPECS

\$320 • www.asus.com.au

124dB SnR • 600ohm headphone amp • 4 x 3.5mm stereo minijacks for 7.1 audio • S/PDIF out; external control box

OVERALL





Far Cry: Primal

STICKS AND STONES WHERE THE GREAT BEAR ROAMS

Up until this point, the Far Cry series has increasingly expanded the scale and spectacle of its sandbox environments, transitioning from a small island in the first game to the African savanna in the second, an island chain in the third and the Himalayas in the fourth. With each game the range of weapons and vehicles available to the player expanded, giving them more and more ways to traverse the environment and slay enemies. Far Cry: Primal pulls back from this approach, but is certainly not a step backwards. From what we've played so far, Primal is shaping up to be the most interesting, and exciting Far Cry yet.

Rather than simply transferring the action to another spectacular location, Primal moves the action in time, placing players in the furs of a Takkar, a Wenja hunter roaming the prehistoric land of Oros, 12,000 years before the present day. The last surviving member of a party that ran afoul of a sabretooth tiger while searching for the fabled homeland

of the Wenja, Takkar must become the leader and saviour of his extended tribe, scattered to the four corners of Oros by a savage cannibalistic tribe.

Takkar plays very differently from previous heroes from the Far Cry series, thanks to a combination of setting and available technology. Oros is something of a verdant paradise, but it is one full of dangers. Wild animals, from pigs and small hunting dogs (dhole) through to larger, more deadly beasts, such as wolves, jaguars, sabretooth tigers and great bears roam the lands, hunting, defending their territory and otherwise following their own natural patterns. As a primitive hunter, Takkar only has the most basic of weapons with which to defend himself and hunt – a few spears, a club and a bow with a limited supply of arrows, making for a very different combat experience than what we've seen before. What we've played showed both a slower and more frenetic pace than what we've seen in previous Far Cry games.

Sniping with a bow is satisfying, but miss your shot and many enemies will charge into melee range, necessitating the use of club or spear. These melee battles against human enemies are brief and brutal, but nowhere near as terrifying as trying to fight off a great bear or enraged mammoth with a pointy stick. In our experience these close quarters battles had an enthrallingly frantic pace,



making them a white-knuckle pleasure. Each of the weapons has unique qualities. The bow has the greatest range and allows for stealthy kills but has limited ammo that can be retrieved from corpses after battle. The spear can be used both as a melee and ranged weapon, being a good defensive option to keep enemies at a distance. A thrown spear does a great deal of damage but Takkar is limited to only carrying a few at a time. The club can be a devastating weapon at very close range and can also be lit to function as a torch. Other weapons and upgrades to the standard weapons can be crafted after Takkar has rescued prominent members of the Wenja tribe and hunter/gathered the required ingredients.

Although an accomplished hunter and warrior, Takkar is special for one key attribute – he is a Beast Master – a hunter capable of taming and controlling animals as well as tracking and killing them. From early on in the adventure, Takkar has access to two animal companions, an owl and a great white wolf. The owl can be used as an aerial scout and can be upgraded to tag enemies, make diving attacks or even drop the rudimentary bombs (one of which is essentially a beehive in a clay pot) on enemies. The wolf is a combat pet, capable of mauling most enemies. Of course these two aren't the only animals that can be tamed – any of the animals of Oros can become Takkar's pets, each bringing their own suite of skills to the table. From what we've seen, some of the larger animals, such as bears, can be ridden, essentially making them the defacto vehicles of the Palaeolithic world.

Far Cry: Primal is shaping up to be the most exciting Far Cry yet and we're definitely keen to get our hands on the finished game when it drops on March 1st.

Daniel Wilks

KEY SPECS

www.far-cry.ubisoft.com/primal

Genre - Sandbox Action • Developer - Avalanche Studios • Publisher - Steam • Platform - PC, PS4, Xbox One



Homeworld: Deserts of Kharak

DESPITE APPEARANCES, WE HAVE NOT JUST FOLDED SPACE FROM IX

At last! A PC game comes out of nowhere and divides opinion both here in the office and around the hypertubes! Truly, Homeworld: Deserts of Kharak nee Homeworld: Shipbreakers is an RTS of the old school. The old, old, possibly ossified school.

While it might seem this game was announced and then released a week later, in fact it was first seen as long ago as 2011. Blackbird Interactive – made up of developers who worked on the original Homeworld – rebadged the game as a prequel to Relic's innovative 1999 3D RTS. Cynical? Perhaps; but this would struggle to carry a new IP.

Because like PC's first RTS-as-we-know it, Dune II, Deserts of Kharak is set entirely in, well, the desert. Terrain does vary from dune fields to canyons to rocky outcrops to saltpan but really, variety is not the spice of anything here.

Our erstwhile editor froths lyrical about the look (Chris Foss inspired, likewise-old-school hard SF tanks and crawlers) and the measured pace, but your enjoyment will depend heavily on what RTS means to you in these exciting times.

Contemporary RTS is split broadly between close-in-and-furious small army micromanagement like Starcraft II, and vast epic thousand-unit battles that take hours to resolve, such as Supreme Commander 2 (still a thing) and Planetary Rippoff I Mean Annihilation: TITANS.

Deserts of Kharak keeps the small-army focus of Blizzard's opus but brings the pace and strategic feel of something much grander. Establishing and holding a position is more important than clicking the special ability button at the right

moment. APM takes second place to situational awareness and a rock-paper-scissors gamble between spending resources to shore up defence, and hoarding space-bux for later missions.

Units, the base carrier and cash reserves carry over between each of the 13 single-player missions, and veteran space-tanks pack a bigger punch than newbies. Tight unit caps mean the choice between recycling a situation-inappropriate vet for a rookie with a bigger/different gun is always nail-biting.

Unfortunately Deserts of Kharak doesn't have that many units to choose from. It really is rock, paper and scissors: light attack vehicles beat railguns which beat tanks which beat light attack vehicles. Late-game hardware adds subtle flavour, and for some reason parking a tank on top of a hill boosts the power of its gun, but apart from that the best strategy is a good mix.

Not that you need a great deal of strategy. The original Homeworlds were famous for their difficulty, but Deserts of Kharak is less of a challenge. The game is old school to a fault, including a spawn-and-swarm AI that relies on overwhelming you with waves of suicide troops. Set up a defensive line correctly, and nothing can get through.

Multiplayer offers just five maps and two factions. Unit differences are cosmetic, and the whole resource collection thing seems very... well, you gotta collect resources in RTS, right? It compels players to make tough choices about army composition, I guess, but there are other ways to do this.

Despite Deserts of Kharak's tight



aesthetic and nifty cutscenes, this really does feel like a bunch of content someone started working on in 2011, and the whole project sat in limbo until a wad of money appeared and now here it is.

For this reviewer, Deserts of Kharak feels retro. It feels like a game from 2011, post-rendering visual effects notwithstanding. It ignores what little innovation has occurred in RTS in the last half-decade and gives the player an unashamed nostalgia trip. It certainly doesn't outstay its welcome: around nine hours should see you through.

But perhaps this what a certain kind of RTS fan wants. A return to the good old days where, on spotting an approaching enemy formation, they do get 20 seconds or so to formulate a reaction, instead of a Starcraft-like "oh I didn't anticipate that and now it's gg."

T E Lawrence said he loved the desert because it's clean. Shudder. This new Homeworld title likewise fetishises sand and sterility. And, well, some of us get off on that.

Anthony Fordham

KEY SPECS

www.desertsofkharak.com

Genre - Auld skool RTS • Developer - Blackbird Interactive • Platform: PC

OVERALL



**It's a
Work of Art.**
Thermaltake Core P5

Tt Thermaltake

The A-List

THERE'S SOME SIGNIFICANT CHANGE IN THIS ISSUE'S A-LIST. BUCKLE UP!

NEW CATEGORY: GAMING LAPTOP

There's so much activity in this segment, with dozens of dedicated gaming machines on sale in Australia, and more released all the time, that we absolutely need to add it to A-List. In key parts of the Asia Pacific territory it's the single fastest growing laptop category of them all, and in some areas more of these are sold than any other type of laptop. At the same time, we feel that the existing Performance category is largely redundant, because the machines we recommend for the other categories largely overlap the broad Performance umbrella – and the most powerful machines you'll find anywhere are indeed the gaming beasts.

The inaugural entry is the mighty Metabox Prime P870DM-G, which we reviewed in the last issue (#219, page 41). It's huge, hot and heavy, but contains the power of Zeus and gobbles frames effortlessly.

What we said:

Where this thing really excites is the desktop-level hardware tucked away inside, which also explains the stratospheric price point. Intel's blazing fast i7-6700K 6th Gen Core processor tops out at 4GHz under load, which is more than enough for even the most demanding of games.

NEW SECURITY SUITE

Off the back of this issue's Labs, in goes Kaspersky Total Security Multi-Device,

our Group Test winner, which replaces Norton Security 2015.

What we said:

Kaspersky Total Security is the only security package on test that achieved both perfect protection and false-positives scores. That in itself is impressive, but factor in the small system footprint and excellent price – not to mention the anti-theft tools for phones – and it's obvious why it remains top dog.

IN DELL XPS 13, OUT: SURFACE 4 PRO

The Dell XPS 13 is a phenomenal ultrabook. We ran our first review last issue on the base model, and now a full review of the highest specification model in the range starts on page 34. It absolutely deserves to be here, but the

bigger news is that we're removing the Surface 4 Pro because it just isn't ready for prime time. I go into more detail in my Login editorial on page 3.

What we said:

As it stands, this is a powerful, light, lovely ultraportable that comes a only hair's breadth from perfection.

ASUS RT-AC5300 WIRELESS ROUTER

Replacing the Netgear Nighthawk X6 AC3200 comes the fatter capacity Asus RT-AC5300. Full review on page 45.

What we said:

The fastest router that has passed through the PC&TA labs. With three different wireless networks in one device to provide oodles of bandwidth for users to connect a large number of devices.

PC DESKTOP

ALL-IN-ONE

Apple iMac 27in with Retina 5K display

★★★★★

PRICE \$2,299

SUPPLIER www.apple.com/au

The Apple 27in iMac with Retina 5K display is great. The best all-in-one computer around, and by a furlong.

SPECIFICATIONS Quad-core 3.2GHz Intel Core i5 processor; AMD Radeon R9 M390 graphics; 8GB RAM; 1TB Fusion Drive; 27in 5,120 x 2,880 Retina 5K IPS display; SDXC card slot; 4 x USB 3; 2 x Thunderbolt 2; Gigabit Ethernet; 802.11ac Wi-Fi



PERIPHERALS

WIRELESS ROUTER Asus RT-AC5300

★★★★★

SUPPLIER www.asus.com.au

NEW

If you're connecting less than ten devices to the twin 5GHz networks, this extra bandwidth isn't necessary, but there's no harm in future-proofing as more devices start including Wi-Fi.

SPECIFICATIONS Tri-band router (2 x 5GHz and 1 x 2.4GHz networks); 802.11a/b/c/n/ac compatible; 4x4 antennae design; Combined rate of 5334Mbps

DESKTOP STORAGE CalDigit T3 with Thunderbolt 2

★★★★★

SUPPLIER www.amazon.com

The T3 is an expensive RAID device, but when you factor in the drives and the capacity included, it's good value.

SPECIFICATIONS 6/9/12/15TB external hard disk with RAID; Thunderbolt and Thunderbolt 2; 135 x 241 x 116mm; 4.5kg



NAS Synology Diskstation DS415play

★★★★★

SUPPLIER www.synology.com

For most home users, the DS415play is very impressive. It's an all in one box that can literally do it all.

SPECIFICATIONS 4x SATA 3.25"/3.5" drive bays; Intel Atom Dual Core 1.6GHz CPU; 1GB DDR3 RAM; 2x USB 3.0 & 3x USB 2.0; 1x Gigabit Ethernet

ALL-IN-ONE PRINTER Canon Pixma IP 8760

★★★★★

SUPPLIER www.canon.com.au

This Canon can do it all, and at a reasonable price.

SPECIFICATIONS 9600 x 2400dpi print; 2400 x 4800ppi scan; USB 2; 802.11n WLAN; 150-sheet tray

LASER PRINTER Dell B1160w

★★★★★

SUPPLIER www.dell.com.au

The best all-rounder in our printer group test, with excellent text printing and decent costs.

SPECIFICATIONS 1800 x 600dpi resolution; USB 2; Wi-Fi; 150-sheet input trays; 331 x 215 x 178

The Kitlog

DREAM BUILDS WITH REAL GEAR

It's been several months since we upgraded the monitor that equips the Game Box. For all that time it's been LG's IPS277L, which was driven in part by value as much as the gaming experience. Under \$500 for a quality 27-inch cemented it firmly into position. All the while, the twin Syncs – G and Free – have been maturing and spreading. It is time.

First, we're giving it to G-Sync over AMD's FreeSync, this is mostly because our current Game Box is built around the Nvidia 970. As we do sometimes, we are splitting the choice between the two best screens going at the moment. One is the Acer XB271HU, which David has reviewed in this issue on page 44, and the other is the almost equally game-worthy Asus PG279Q, which we reviewed in PC&TA217, page 41).

Each offers 2560 x 1440 pixels of lushly smooth G-Synced frames at a default 144Hz, and 165Hz in overdrive. Each has a thinner than thin bezel, and there's really nothing between them apart from a card reader on the Asus.

We've been waiting for the price to come down a bit, as the Game Box isn't a no-holds-barred machine, and now with each available on the street for around \$1,050 the time is right. So, yes, this adds a bit over \$500 to our sample build, but for that you get luxuriously smooth frames up to 165 FPS when paired with an appropriately powerful Nvidia GPU, and in a fairly large 27-inch package.

IT'S A NEW GAMING MOUSE!

Logitech's G502, as reviewed in this issue's Labs Briefs, is our new favourite gaming mouse, replacing the still excellent CM Storm Reaper which still sits on its throne in our Perfect PC build.

What we said:

No box is left unchecked with this rodent. It's perfectly ergonomic for most hand sizes, with buttons you won't ever miss or accidentally hit. Rubber inlays on both sides work with any hand position and you won't be fudging up a move through sweat-slip (new word!). The DPI is adjustable in individual increments via the excellent software, all the way up to 12,000DPI and you get polling rate options too, covering 125, 250, 500 and 1000Hz. Profiles for unique settings can be saved to Windows, or the device's onboard memory, and they can switch automatically when a game is fired up, allowing a Windows desktop profile to be kept separate.

THE GAME BOX

CPU



INTEL CORE I5 6600K

PRICE \$325

Gaming generally doesn't make use of hyper-threading which makes this the CPU of choice for this box.

MOTHERBOARD

ASUS Z170 PRO GAMING

PRICE \$279

Our Skylake Value Award winner, it packs in a complete set of features yet is priced reasonably. Good audio also means we don't need a sound card.



MEMORY



8GB OF DDR4

PRICE \$120

The speed and brand makes so little difference to performance we can't recommend one over another.

VIDEOCARD

NVIDIA GTX 970

PRICE \$500

Quiet, sips power, but when the performance is needed this blazer eats up the frames.



THE PERFECT PC

CPU



INTEL CORE I7 6700K

PRICE \$525

Intel's top-shelf unlocked i7 CPU.

MOTHERBOARD

GIGABYTE GA-I70X GAMING G1

PRICE \$800

The most complete 100-series motherboard you can buy today.



MEMORY



32GB OF DDR4

PRICE \$430

For a general-purpose build 16GB is all you need, but go big if you know you need more.

VIDEOCARD

MSI GTX 980TI GAMING 6G

PRICE \$1089

Faster than a Titan X and several hundred dollars cheaper, this is an outstanding 980TI.



TOTAL: \$3566 RIG ONLY: \$1917

COOLER



COOLERMASTER NEPTON 140XL

PRICE \$120

Easy to install AIO CPU cooling, relative quiet and performance to rival twin-radiator units.

CASE



BITFENIX RONIN

PRICE \$99

BitFenix continues to deliver great budget cases that look terrific and are easy to build in.

SYSTEMDRIVES

SAMSUNG 850 PRO 512GB

PRICE \$349

This SSD offers greatly improved durability. Supplement it with a hard drive of your choice if needed.



KEYBOARD

CORSAIR K70

PRICE \$190

The glorious perfection of mechanical keys with well thought-out gamer design.



DISPLAY

ACER XB271HU

PRICE \$1,050

G-Sync'd frames up to 165Hz in a generous 27in size yet with a super thin bezel.



NEW

ASUS PG279Q

PRICE \$1,050

The same core specs and capabilities of the Acer, with an added SD card reader.

MOUSE



NEW

LOGITECH G502

PRICE \$120

Comfortable, controllable and impressively adjustable.

AUDIO

HYPERX CLOUD II

PRICE \$149

The HyperX Cloud II provide excellent sound quality and not just for the price range.



OR

CORSAIR VOID

PRICE \$130

The USB 7.1 model is the best balance between price and performance.

POWER SUPPLY

COOLER MASTER G750M

PRICE \$125

Outstanding value for money, it's powerful enough for even performance PCs packing twin GPUs.



TOTAL: \$8127 RIG ONLY: \$6820

COOLER



CORSAIR H100i GTX WATER COOLER

PRICE \$160

Excellent cooling that is easy to install with advanced monitoring.

CASE



ANTEC S10

PRICE \$599

If you absolutely must have what is very nearly the best case we've seen, this is the one.

SSDS

INTEL 750 1.2TB SSD

PRICE \$1499

Leaves SATA SSDs in the dust.



OR

2 X SAMSUNG 950 PRO 512GB PCIE/M.2 SSD

PRICE \$429 each. Intel's equal, and in a smaller M.2 form-factor.

KEYBOARD

CORSAIR VENGEANCE K95

PRICE \$189

The perfect keyboard. Lovely Cherry Red mechanical switches, a slick and attractive aluminium body and customisable backlighting make this The One.



HDDS

ANY HDD

PRICE \$100 (2TB)

Supplement the SSD with cheap HDD storage.



MOUSE



CM STORM REAPER

PRICE \$75

Very solid and feels fantastic under the hand with sweet on-screen movement.

AUDIO



PHILIPS BDM4065UC 4K 40"

PRICE \$1019

It's huge, remarkable value and having one in front of you is PC paradise.

POWER SUPPLY

CORSAIR HX1000i

PRICE \$299

Corsair's mighty HX1000i pumps out extremely reliable power, even when under full loads.



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AND PORTABLE STORAGE PACK!**

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The sleek and light My Passport Ultra packs your files into an easily portable drive. It can automatically back-up to the cloud and offers secure password protection to keep your files from prying eyes.



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SKYLAKE OVERCLOCKING UNLOCKED

Extract maximum performance from non-K series Intel 6th-gen CPUs

Until now, PC enthusiasts who wanted to push their Intel Skylake CPU (aka 6th Gen Core) beyond the speed printed on the box had to buy one of the special K-class CPUs along with a Z170-chipset based motherboard. This combination was officially sanctioned by Intel to allow overclocking, with the CPU's unlocked multiplier making it a breeze to push these chips over and above their rated speeds. If you didn't own a K-class CPU with the relevant motherboard, you were stuck with the default speed of your chip... until now. As we saw with the last generation of CPUs, a batch of hacked motherboard BIOS updates have enabled overclocking across every single Intel Skylake CPU, regardless of whether or not it's part of the K-class. Before we show you how to do this, let's delve into the muddy waters surrounding this issue.

VALUE WINNERS

Intel probably isn't too happy about the ability for all of its chips to be overclocked, as it means users no longer have to pay the higher price of a K-class CPU. It also means that much more affordable chips can now compete with their most expensive models; why spend \$520 on an i7 6700K when you can buy a \$275 i5 6500 that will run even faster than the default speed of the 6700K?

SUPERMICRO BIOS HACK

The news that non-K chips could be overclocked first leaked in December of last year, with users of special Supermicro BIOS' able to push their

chips to higher speeds despite the locked multiplier. This new BIOS didn't magically unlock the multiplier on non-K chips; instead it allowed the user to push up the base clock (BCLK). A CPU's overall speed is calculated by multiplying the BCLK by the multiplier, so increasing either one will increase the speed of the CPU. All Intel CPUs have a BCLK of 100MHz, with only the multiplier changing. BCLK overclocking isn't new, but in the past we were limited to increasing this by a maximum of 5%, as it was linked to the DMI and PCIe buses. Pushing the BCLK too high meant that both the DMI and PCIe buses were running way out of spec, causing the system to crash.

However, with Skylake Intel introduced individual reference clocks for these various buses, meaning it's possible to increase the BCLK without pushing the other buses beyond their limits. This ability to increase the BCLK so greatly wasn't included with the original range of Z170 boards, but Supermicro's release of a hacked BIOS suddenly made it possible to push it by up to a whopping 70%.

ASROCK JUMPS IN

It wasn't long before ASRock joined the party with a hacked BIOS for their boards, and other manufacturers soon followed suit. Yet it seems that Intel has put pressure on motherboard makers not to do this since then, as it's impossible to find these special BIOS versions on

the official motherboard websites. From what we've heard, Intel can impose certain pressures on companies who break the terms of service that stop them selling products that can overclock non-K CPUs; these could be fines, higher prices, lower co-marketing budgets or even reduced allocation of silicon. We're not sure exactly what Intel is doing to stop these BIOS spreading, but they're doing something, as we asked several large makers about the leaked BIOS. MSI refused to comment at all, while Asus told us that "No Asus products will ship with non-K OC capability/feature due to the inherent drawbacks of the implementation and the fact that this is not officially endorsed by Asus." Gigabyte echoed Asus' sentiments, stating that "We won't have it on official download site nor do we mention the ability in beta bios that supports it." Yet all of these companies sell Z170 boards that support non-K overclocking, provided you know where to find the right BIOS – on community websites.

When we asked Intel about the matter, and whether they would introduce microcode in their Skylake chips to halt this ability, they gave us a very short reply, claiming "Intel does not recommend overclocking processors that have not been designed to do so. Intel does not warranty the operation of the processor beyond its specifications."

So it appears nobody officially wants to talk about this new form of overclocking, yet it's out in the wild and taking place. It seems that any Skylake CPU can be overclocked, but it appears that it's still limited to Z170 motherboards.

When we asked Gigabyte about why this is, they replied that the H and B series of motherboards need a special buffer chip to increase the BCLK effectively. There's also the matter of the power and voltage design on low-end boards, which aren't as stable as those found on the Z170.

THE TRADE-OFF

If you're going to overclock a Non-K Skylake CPU, there are a few caveats to bear in mind. For starters, as with any overclock, you risk damaging the CPU. Intel won't cover the warranty on Non-K CPUs that have been damaged whilst overclocking, but then again there's absolutely no way to prove that this is how a CPU was damaged. Just



saying. The easiest way to limit the risk of damage to the CPU is by keeping the voltage as low as possible; increasing it too high is the number one way of frying an overclocked CPU. Secondly, you're going to need to upgrade the cheap Intel cooler that comes with the CPU – a dedicated overclockers heatsink is a must, especially due to the additional voltage that is necessary.

When overclocked, Non-K CPUs automatically have their integrated GPU disabled, so you're also going to need a dedicated graphics card. The temperature monitoring will also be bugged, with the chip reading 100C or other crazy temps, so you'll need to

disable any features on your mobo that shut off the chip if the temperature goes too high. Most power-saving features, such as C-states, will also be disabled,

“we think it's a worthwhile trade-off if you're able to run your \$260 i5-6400 at 4.5GHz!”

so the overclocked CPU will always be running at top speed using full power. Finally, and this is a biggie for those who do a lot of media transcoding,

scientific or financial applications, the Intel Advanced Vector Extensions (AVX) performance plummets. We're not exactly sure why this is, but gamers and general desktop users shouldn't be fussed about this, as these kinds of scenarios don't use the AVX instructions.

As you can see, overclocking Non-K chips has more limitations than K series chips, but we think it's a worthwhile trade-off if you're able to run your \$260 i5-6400 at 4.5GHz!

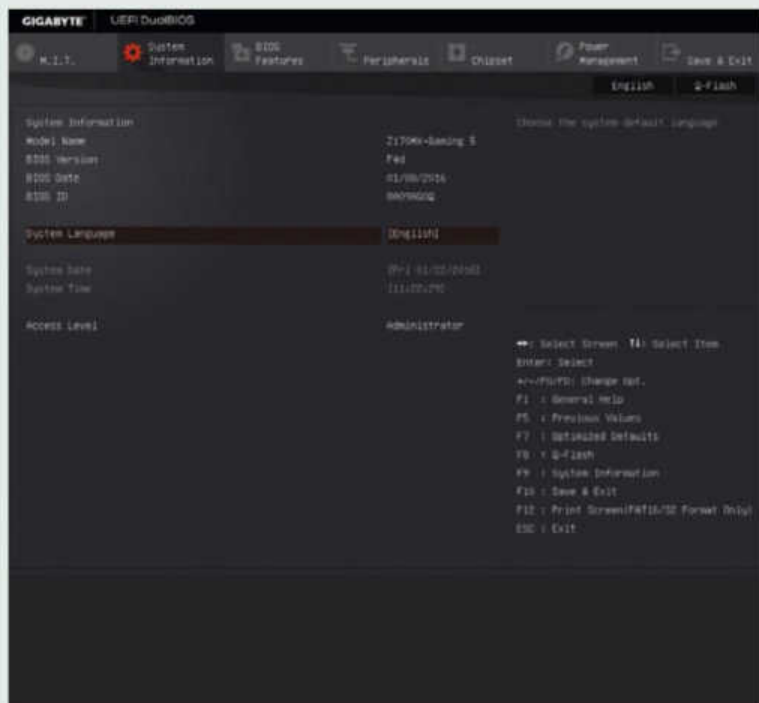
Also, the issue of accurate and reliable temperature monitoring can be gotten around by buying an external temperature monitor, which allows you to stick a probe near the CPU.

LET THE FUN COMMENCE!

Now that you know the warnings and limitations, let's take a look at the actual process of overclocking a Non-K Skylake CPU. For our test we used a Gigabyte Z170MX Gaming 5 motherboard with the special F4D 8A09AG0Q BIOS, dated 8th of Jan. Intel kindly lent us an i5-6500 CPU, which has a default multiplier of 36, resulting in a top speed of 3.6GHz. Corsair's H80 All-in-One cooler was tasked with handling thermal duties, while twin sticks of Crucial Ballistix DDR4 memory

supplied 16GB of system memory. Two more Corsair SSDs held our Windows 10 operating system and benchmarks.

Please note that the directions that follow are specific to our motherboard – different manufacturers use different BIOS layouts and terminology. However, you should be able to find the same settings on your motherboard, but they may be in different menus and with slightly different wording.

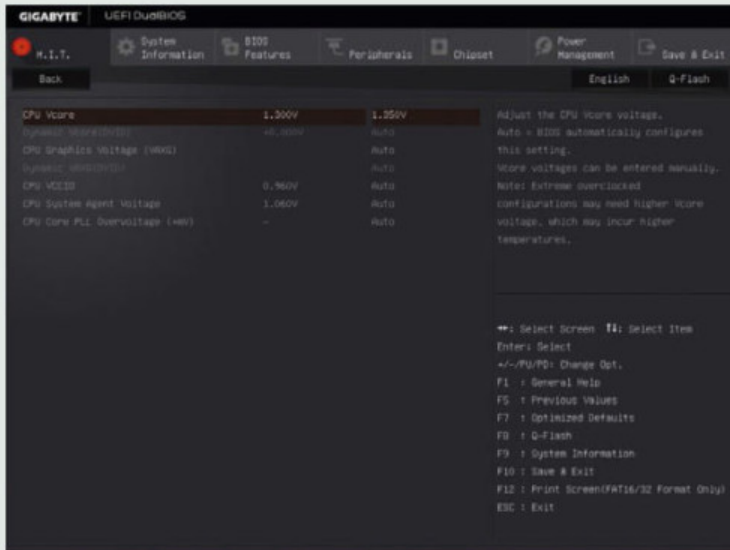


Non-K BIOS

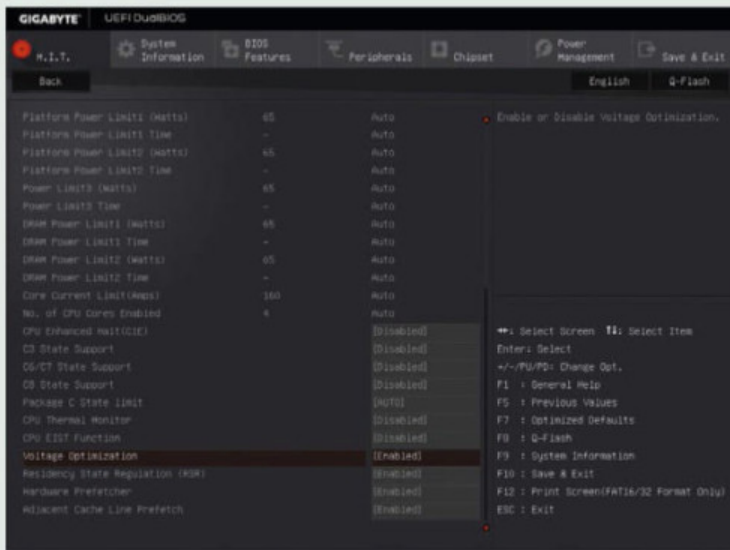
First of all get the correct BIOS for your board:

1	GIGABYTE GA-Z170-HD3P Non-K OC BIOS	December 24, 2015	4.46 MB	333 downloads
2	GIGABYTE GA-Z170X-Gaming 3 Non-K OC BIOS	December 24, 2015	4.43 MB	8080 downloads
3	GIGABYTE GA-Z170X-Gaming 7 Non-K OC BIOS	December 24, 2015	4.44 MB	248 downloads
4	GIGABYTE GA-Z170X-Gaming 7 Non-K OC BIOS	December 24, 2015	4.44 MB	193 downloads
5	GIGABYTE GA-Z170X-Gaming GT Non-K OC BIOS	December 24, 2015	4.46 MB	223 downloads
6	GIGABYTE GA-Z170X-Gaming G1 Non-K OC BIOS	December 24, 2015	4.47 MB	138 downloads
7	GIGABYTE GA-Z170X-SOC Force Non-K OC BIOS	December 24, 2015	4.44 MB	225 downloads
8	GIGABYTE GA-Z170-D3H Non-K OC BIOS	December 26, 2015	4.43 MB	290 downloads
9	GIGABYTE GA-Z170M-D3H Non-K OC BIOS	December 26, 2015	4.43 MB	211 downloads
10	GIGABYTE GA-Z170N-WIFI Non-K OC BIOS	December 26, 2015	4.53 MB	211 downloads
11	GIGABYTE GA-Z170X-UD3 Non-K OC BIOS	December 26, 2015	4.43 MB	313 downloads
12	GIGABYTE GA-Z170XP-SLI Non-K OC BIOS	December 26, 2015	4.43 MB	217 downloads
13	GIGABYTE GA-Z170-HD3 Non-K OC BIOS	December 26, 2015	4.50 MB	305 downloads

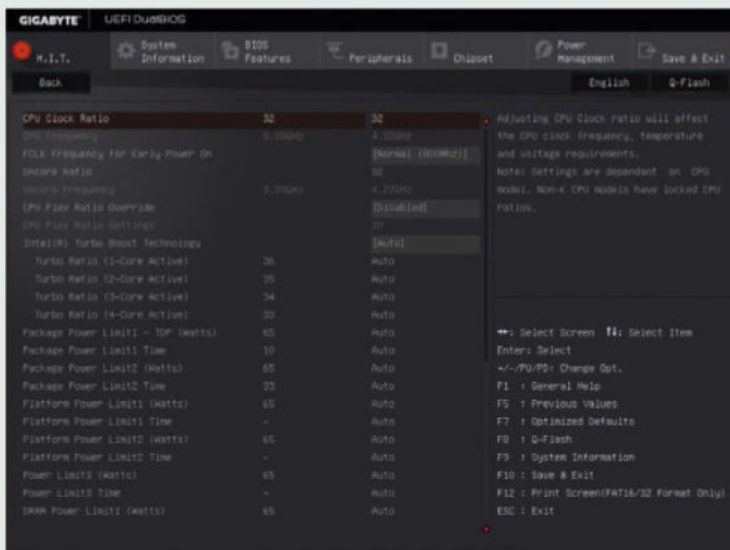
First things first, you're going to need to dig around the Internet to find the right BIOS. As motherboard makers aren't officially hosting these on their sites, you'll need to do some Googling to find it – the chances are that if you're running a Z170 board, there should be a hacked BIOS that allows BCLK overclocking. Once you've found the BIOS, stick it on a USB thumbdrive, plug it into your motherboard and head into the BIOS as it boots (usually hitting delete or F1 does this). From here you should find an option to flash your motherboard's BIOS. Select the new BIOS version and let the software do its job. Reboot the PC, and run a quick benchmark to ensure everything is working and stable as is. We use 3DMark Fire Strike, set to looping mode, and let it run for 30 minutes – if it doesn't crash, it's time to start tweaking.



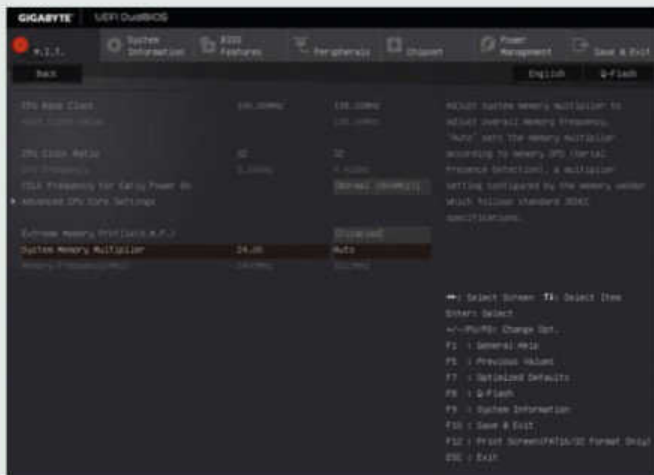
2 Now it's time to increase the voltage on the CPU. At stock, our i5 6500 has a voltage of 1.145V, so we're going to increase it to 1.35V, which is a relatively safe voltage for our CPU with this cooler. Head to the area of your BIOS pertaining to voltages; on our board it was called 'Advanced Voltage Settings'. Then select the CPU Core Voltage Control, and find the CPU Vcore setting in this screen. Manually type in 1.3V, then hit F10 to save and reboot. Head back into the BIOS. Now we want to set the Vcore Loadline Calibration. Once again head into the 'Advanced Voltage Settings', and then select 'Advanced Power Settings'. Change the value of the 'CPU Vcore Loadline Calibration' to High.



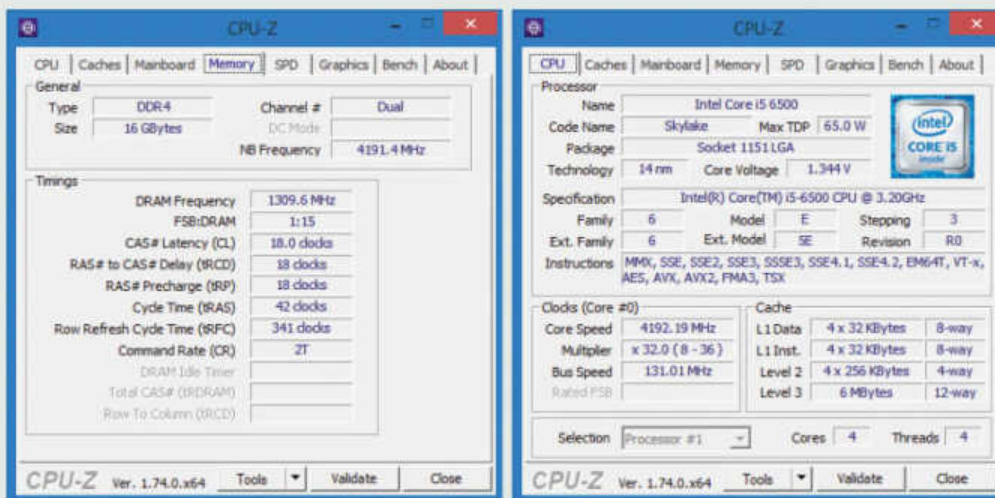
3 It's time to disable all of the power saving settings, which can interfere with the overclock. At the main BIOS screen, head into the section called 'Advanced Frequency Settings', then select 'Advanced CPU Core Settings'. Scroll down until you find the CPU power saving features, beginning with 'CPU Enhanced Halt (C1E)' and change this to disabled. Then change all of the following settings to disabled: 'C3 State Support', 'C6/C7 State Support', 'C8 State Support', 'CPU Thermal Monitor' and 'CPU EIST Function'. Hit F10 to save the BIOS settings and reboot.



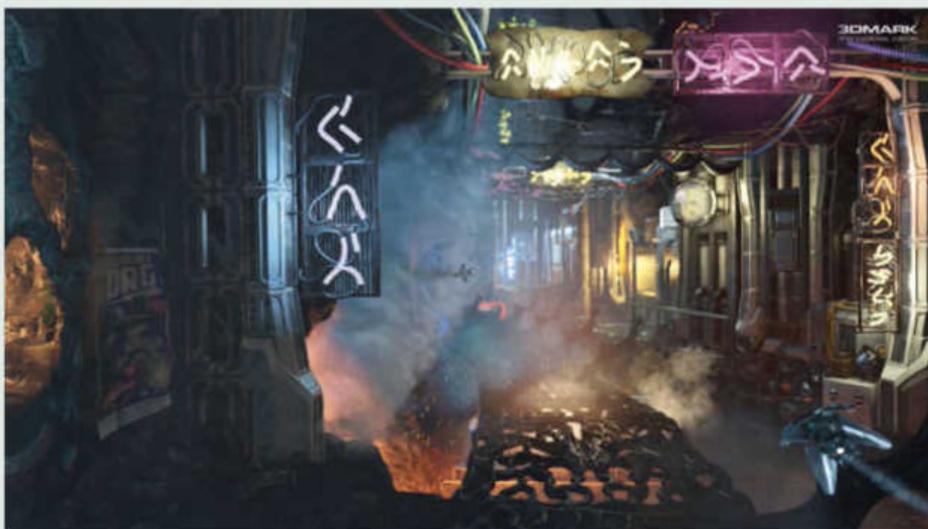
4 Now head into the BIOS again, and go to the 'Advanced Frequency Settings', then head to 'Advanced CPU Core Settings'. Change the 'CPU Clock Ratio' (aka the CPU's multiplier) to the maximum supported by your CPU at default speed, not Turbo speed. In the case of the i5 6500, this is 32, as the CPU has a default speed of 3.2GHz. Now change the 'Uncore Ratio' to the same value. Hit F10 to save and reboot, then head back into the BIOS.



5 It's time to see your CPU fly! We're going to adjust the BCLK, as well as the system memory multiplier, as the system memory is tied to the BCLK. Increase the BCLK and your system memory speed will increase, so we need to lower its ratio to something within range of what your memory kit can handle. Note that around 2800MHz is about as high as you want your memory to run when doing this form of CPU overclocking. From the main overclocking menu, go to the 'Advanced Frequency Settings' and change the 'CPU Base Clock'. The amount to change it to depends on your CPU. We are going to aim for an initial overclock of 4.4GHz, so therefore we divide 4400 by the multiplier of 32, giving us a BCLK value of 138MHz. Just below this you'll see the 'System Memory Multiplier'. If we don't touch this, our memory will be running at 3312MHz due to the increase in BCLK, so we're going to lower the memory multiplier to 18, giving us a memory speed of 2484MHz. Cross your fingers, and then hit F10 to save and reboot. With any luck, you'll be able to boot into Windows



6 As luck would have it, it appears our i5 6500 was a bit of a dud, as it refused to boot at 4.4GHz. So we rebooted, and headed back into the screen to adjust the BCLK, instead aiming for a 4.2GHz overclock. We achieved this by using a BCLK of 131MHz, and then adjusted the memory multiplier to keep the memory running as close to 2400MHz as possible. To our delight, the system booted into Windows perfectly!



7 Now it's time to test for stability. Due to a bug with Skylake, we don't recommend using Prime95, as even default speed Skylakes have been shown to crash this benchmark. BIOS updates are slowly coming out that fixes this, so check your manufacturer's site to see if yours is ready. Instead, for now we're sticking with 3DMark Fire Strike in looping mode. We ran this for an hour without any crashes – it's better to keep it running even longer if possible, but we were limited in time.

Unfortunately our i5 6500 refused to budget past 4.2GHz, which is only a small 17% increase over the default speed. However, it seems most 6500 chips are able to hit 4.5GHz without too much trouble, while even more affordable chips are hitting 4GHz to 4.2GHz with ease. It's really a lottery, as these chips aren't picked for their overclocking ability, unlike the K-series are supposed to be. Good luck with your Skylake overclock – hopefully a 30% overclock or better is possible, which seems to be the average of most non-K overclocks.



HOW TO SECURE YOUR WORDPRESS SITE

Nik Rawlinson walks you through the process of beefing up security on your WordPress-

WordPress powers almost a quarter of all the live sites on the web. That's not surprising, as it's well supported, easy to use and extremely flexible. It's no longer just a blogging tool either, since the fully fledged content management system sitting behind the friendly interface is more than capable of running hugely popular sites.

Unfortunately, the more popular a system becomes – be it Windows, Android or a publishing tool such as WordPress – the more it attracts the attention of less scrupulous users. Put simply, it's never been more likely to be attacked than it is right now.

But there's some good news. There is a huge range of tools and extensions designed to fix this problem, so you can quickly and easily make your WordPress site more robust, even if your behind-the-scenes expertise doesn't extend much further than installing an off-the-shelf theme.

In this guide, we'll show you how to harden your site. Follow our advice and it should withstand almost all attacks, and make it a much less attractive target. Even if your defences do eventually fall, you'll have a much better chance of being back up and running in short order, with the minimal data loss.

Before you get started, though, follow one simple piece of advice that we'd give to anyone on any platform: if you haven't changed your password in the past six weeks, do it now – and require the same of the other users running accounts on your system. You should consider installing the WP Password Policy Manager to automate password expiry on a regular basis and enforce rules for generating more complex passwords.

We prefer not to use an external password manager when working with a tool such as WordPress, because the primary benefit of using online applications is that you can access them from anywhere, at any time. So, if we have a particularly complex password that we can't possibly remember without the help of a digital locker, we'd effectively be shut out whenever we're away from our primary PC (unless it's stored in a smartphone app).

We have, therefore, got into the

habit of building unique, but easy-to-remember, passwords for every site we need to access as follows:

■ Think of a meaningful sentence that nobody else would guess, including names, numbers, ordinals and punctuation. For example: "Why did you call your second pet Bob?"

■ Take the initials of each word, convert written numbers into digits, include their ordinals and retain capitalisation. Using this example, we'd end up with "Wdy2ndpB?" That's already difficult to guess, but easy to remember.

■ Add some letters from the domain you're logging in to. You should always choose the same letters for every domain. You might choose the last two letters, such as "hr" for alphr.com, "il" for gmail.com and "" for smh.com.au. Position them somewhere within your sentence. For example, we might choose to reverse them and put them before the "2", so that when we're logging in to alphr.com, our password would be "Wdy2yrh2ndpB?", while for Gmail it would be "Wdy2hli2ndpB?".

■ The result is a hard to guess, easy to remember password for every site we need to access, which is unique to each

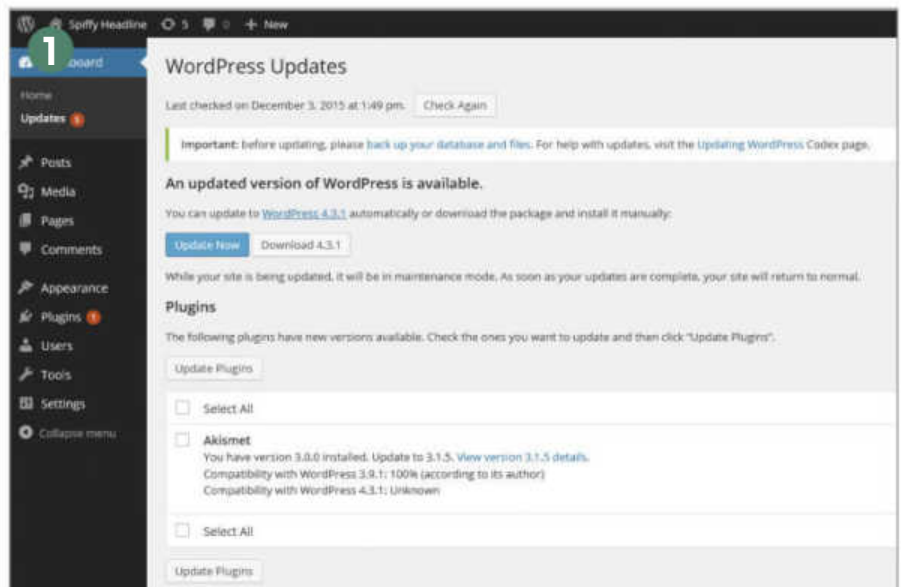


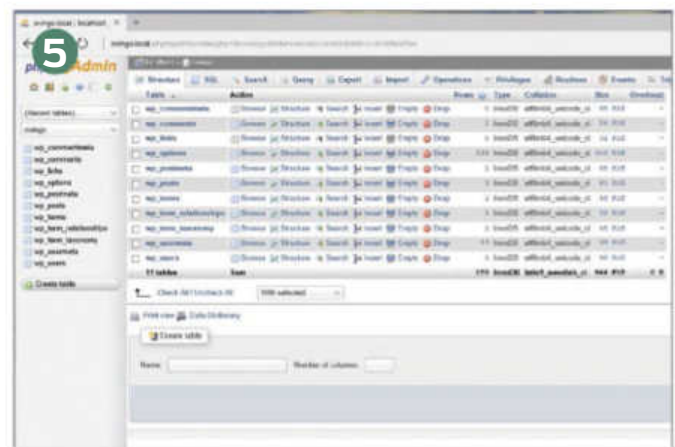
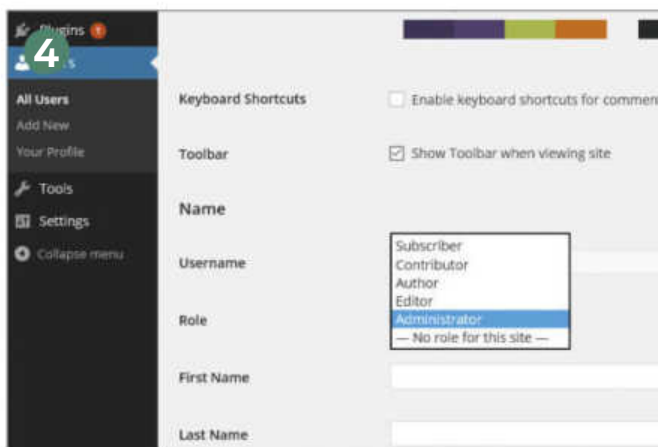
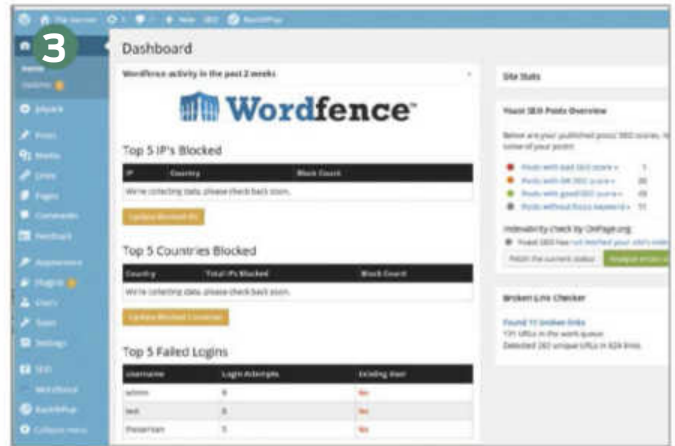
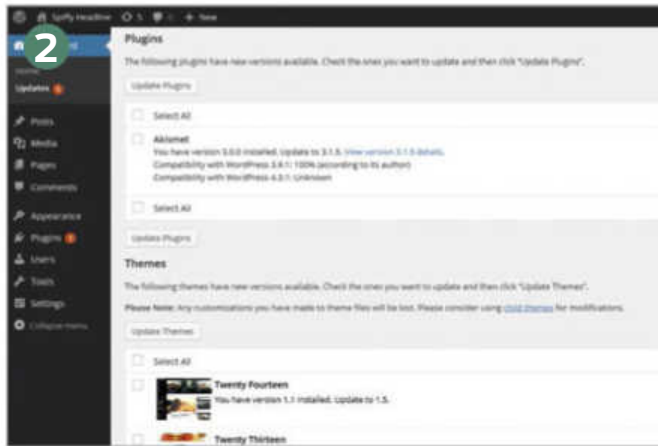
one. Even if you choose to change your password every six weeks, you still only need remember one new sentence and one formula for all of your logins.

Setting (and retaining) a feeble password will make much of what follows pointless, since you're effectively securing your site's front door with the weakest padlock. So, the first step is to reinforce your credentials as above, then read on as we work through the remainder of the process.

1 KEEP WORDPRESS UP TO DATE

WordPress is constantly updated, with major point revisions introducing new features, and minor updates focusing on patches and security. Make sure that you're always running the most recent versions, both of WordPress itself and your plugins and themes, to mitigate against vulnerabilities. The most recent public release is WordPress 4.3.1. You'll know if you're running it – it's detailed at the bottom of every screen in the Dashboard. If you're not up to date, the line will change to "Get version x.x.x".





Click on it to go to the update page. Note that, if you're running WordPress 4 or later, minor revisions are installed automatically.

2 UPDATE PLUGINS AND THEMES

It's just as important to keep your plugins and themes up to date as the core WordPress software. You will know if these are out of date when the update icon beside your site name at the top of the Dashboard (the two circular arrows chasing each other) has a number beside it. Click on it and apply whichever patches are required. If you've tweaked your installed theme then you should take extra care because installing an update will usually overwrite your amendments, unless you have applied them using a child theme. If you're not using a child theme, always remember to save a backup copy of your amended theme before applying the update so you can reinstate your changes afterwards.

3 INSTALL A SENTRY

You can't spend all day watching your back-end waiting for hackers to force their way in, so install Wordfence to do the job for you (wordfence.com). There are both free and paid (\$39/year)

“Make sure that you are always running the most recent version of WordPress, to mitigate against vulnerabilities”

plans. We'd recommend starting with the free option and upgrading, if you choose. Without paying, you can block IP addresses, scan for DNS changes, hunt out known malware and backdoors, limit crawlers and, perhaps most importantly, repair any files that become corrupted or changed from their original make-up, which may point towards an installation of unauthorised code on your server.

An at-a-glance Wordfence panel on your WordPress dashboard details unauthorised login attempts over the past couple of weeks, allowing you to identify which user accounts are being targeted most frequently. As you can see from the screengrab, it's detected nine attempts to log in to one of our sites using the nonexistent account “admin”, which leads us on to our next point.

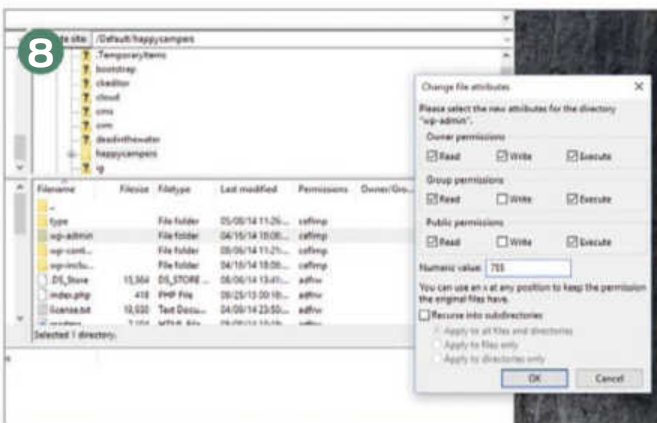
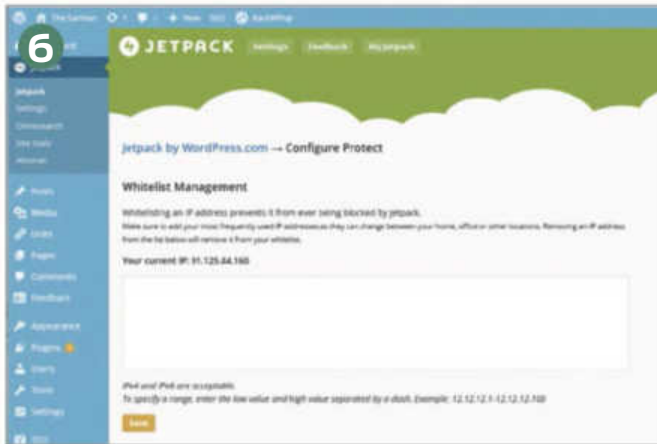
4 KILL YOUR ADMIN USER

Determined hackers will resort to brute

force to break into a system. Make their lives more difficult by not setting up (or by deleting) any “admin” logins. Many systems – particularly those updated over many years from old installations where admin was the default username – still have these in place. Removing them means the hacker will not only need to guess your password, but also the account name to which it relates, dramatically reducing their chances of success. Make sure you give another user administrator rights through the Dashboard by clicking All Users from the Users flyout on the sidebar, clicking Edit below one of your existing users' names and changing their role to “Administrator”.

5 RETHINK YOUR TABLE PREFIX

When you're setting up a new site, the WordPress installer will ask what prefix you'd like to use for your table (where all the blog data is stored). It suggests “wp_” by default, and a lot of hackers will assume that you've stuck with this, potentially giving them a head start on targeting your MySQL database directly. Make life more difficult for them by changing this for any new site you set up from now on. It's not something you'll need to type more than once, so pick something obscure and difficult to guess.



6 BENEFIT FROM OTHER PEOPLE'S MISFORTUNE

A bonus of running the same back-end as many other sites is that you can gain from their experience. Install the free Jetpack extension (search for it by clicking Plugins | Add New in the Dashboard sidebar) and enable the Protect tool. This compares the IP address of every user (or bot) that visits your site with a list collected by other sites running Jetpack with Protect enabled. If any of them has reported the address as being the basis of a brute-force attack, it's blacklisted, and it will be denied access to your site.

7 HIDE HELPFUL ERROR MESSAGES

Sometimes, just knowing why they're not succeeding can give a hacker sufficient clues to break into your site. Muting login error messages so they no longer say whether the username or password is incorrect on a failed login attempt helps here, and can be implemented by adding a single line of code to your functions.php file. You'll find this in your current theme directory. Open it using your preferred code editor and add the following immediately before the closing ">" at the end of the file:

```
add_filter('login_errors',create_
function('$a', "return null;"));
```

This tells WordPress that when an error occurs, it should give a blank response (null).

8 CHECK (AND LIMIT) YOUR PERMISSIONS

Don't allow anything – or anyone – access to more of your server than they absolutely need. WordPress itself recommends that all folders be set to 755, and files to 644.

You can usually set these using your FTP client by right-clicking the folder or file (or group of folders or files) and picking Set Permissions, Info or CHMOD from the menu.

If your FTP application doesn't allow you to type in the numbers directly, set the permissions by checking the following boxes:

755: read, write and execute for "user", and read and execute for both "group" and "world"

644: read and write for "user", and just read for both "group" and "world"

Depending on your configuration, it may be necessary to be a little more

permissive, by setting these to 775 and 664 respectively. It's easy to work out how to do this, since the permissions are set in accordance with each level's assigned binary value. Read scores 4, Write scores 2 and Execute scores 1, so 775 would be read, write and execute (4+2+1) for both "user" and "group", and read and execute (4+1) for "world".

For information on file permission for a secure installation of WordPress, go to https://codex.wordpress.org/Hardening_WordPress#File_Permissions. To understand file permissions, read https://codex.wordpress.org/Changing_File_Permissions.

9 BACK UP REGULARLY

You should keep regular backups of your WordPress site – both your uploaded files and your database content. But how? Automattic, the company that guides WordPress' development, has a solution, the paid-for VaultPress (vaultpress.com). For \$99 a year, it will make daily backups and keep a 30-day archive for rolling back.

If you have a Dropbox account, check out BackWPup, a free install from the WordPress extensions repository. This backs up your site to Dropbox (we'd recommend daily for a busy site) at no charge. ●

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**TOP 25 FANTASY
CHARACTERS**

Who makes the cut?

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Fantasy stories and the
Heroic Journey

AN INTRO TO D&D

Lessons from a first time
dungeon master

ON SALE NOW



DISRUPTING DELIVERIES: DRONES, ROBOTS AND UBER TAKE ON COURIERS

Online shopping is held back by physically getting the goods to your door. **Nicole Kobie** reveals the high-tech solutions that are on the way – and in the air

You find the perfect item online and pay extra for next-day delivery. But instead of your package, you return home to a “while you were out” card on the doormat.

Imagine, if, instead of waiting for an ill-timed driver to knock on your door, you could tell a drone or robot exactly when you would be home. Futurist Patrick Dixon believes this couldn't come soon enough. “The online channel is too slow in terms of delivering online product,” he told attendees of Nexterday North in Helsinki. “Billions of products were delivered into homes this year, but who cares, because no-one is at home.”

Of course that's an exaggeration, but missed deliveries are a serious problem. Mail statistics suggest 12% of deliveries fail the first time, and that's one of the major reasons why we still prefer to shop in a retail environment.

JUST-IN-TIME DELIVERY

Some solutions to the delivery dilemma already exist. For example, packages can be sent to “click and collect” boxes at your local corner shop, but tech giants and startups alike believe we can do better, and soon. Indeed, Dixon points

▼ UberRush will bring packages to you, no matter where you are

out that the technology already exists to make just-in-time package deliveries.

“Imagine that I rush off the train platform and, because I'm tired, I forget to take my [mobile phone] power supply,” he said. “I'm going to the airport, I'm straight into a long flight, straight into another event. I don't have time to buy another power supply... What am I to do?”

You could order a new power supply

“Mail stats suggest 12% of deliveries fail first time, and that's one of the major why we still prefer to shop at retail”

from Apple's website, and have it picked up by an Uber driver. “But Uber will be too slow to chase me to the airport, so they order an Uber bike. The Uber bike comes to the store, [picks up the package] and he can see where I am, and he's chasing me down the motorway – I can see him, he can see me. We're looking at the convergence [point]. He screeches to a halt at the first traffic light, I wind down the window and say ‘thank you’ – he's off and I'm off to the



▲ Starship Technologies' bin-like delivery robot carries parcels the “last mile” to your home

airport.” That may sound a bit dramatic for a mislaid power supply, but Uber already has thousands of cars on the road, and they're not only carrying people. “Imagine if you could use the same network of drivers to also get other things,” said Jo Bertram of Uber at the same Wired conference.

That's UberRush, which is now being trialled in three US cities. Not only does it mean shoppers can get deliveries more quickly at a time that suits them, it also avoids trips to chain stores. “Customers can think about buying local,” she argued.

It's easy to see how autonomous cars – something Uber is investing in – or drones could be useful for deliveries, but Bertram suggested robotic deliveries are at least five years away, if regulators ever allow them. However, Uber believes that, in the meantime, it can push down delivery prices. By combining the UberRush delivery service with UberPool, its ride-sharing app, drivers can pick up multiple packages.

DRONING ON

But why suffer traffic when you can take to the sky? Amazon and Google are actively developing drone delivery systems, and DHL is already making deliveries to the German island Juist.

Two years ago, Amazon CEO Jeff Bezos claimed his company's unmanned airborne delivery drone could carry 3.2kg for half an hour. Promotional videos show the Amazon Prime Air gliding over homes before landing gracefully in a customer's back garden, dropping off a small package, and then lifting off and flying away.

Project Wing is Google X Lab's version, and project head David Vos believes it will be ready to take to the skies by 2017. Unlike rivals, Project Wing isn't a quadcopter, but looks like a tiny plane and takes off in an upright position, depositing packages after lowering them to the ground on a string.

Startups are also looking to the skies.





◀ Google's Project Wing deposits packages by lowering them to the ground on a string

company has built a delivery robot to carry parcels the "last mile" to your home, which is the expensive bit. Starship robots look like adorable squat bins on wheels, but feature a set of

"landing in a customer's back garden, dropping off a package, and then lifting off and flying away"

nine cameras, connectivity, and all the requisite sensors to navigate along the pavement from their docking station to your home, with your delivery inside.

Your orders are delivered to the fully automated Starship hub. When you're home to accept the package, you notify the hub and it places your goods into the robot, which trundles along at walking speed. The robots stop if someone steps in its way, calls home for assistance if it gets confused, and has security covered with locked compartments, cameras and GPS tracking. Still, it's hard to imagine pranksters or thieves leaving them alone. Starship hopes to have the robots carrying our shopping home as early as the second quarter of 2016. The only question is, like their human counterparts, will they still stick a "sorry we missed you" card through the letterbox even when you're in? ●

Flytrex Sky can carry small items and is connected to the cloud via 3G, letting you track the drone to your home. Founder and CEO Yariv Bash unveiled the system at the Retail conference, showing how the drone would send a notification to your phone when it arrived over your home, and only drop the package when you confirmed you were available to accept it.

Flytrex Sky launched last summer, but Bash admitted challenges remain, including managing airspace, gaining regulatory approval and figuring out

where to land drones. What if you live in a flat or don't have a garden?

There's another hurdle: public perception. Founder of Starship Technologies Ahti Heinla told the Retail conference that unmanned air parcel delivery may simply never win over the public – who wants "other people's groceries swinging over the heads of their children?"

ROBOT DELIVERIES

Naturally, Heinla has his own solution: the former Skype founder's latest

THE ROBOTS

FLIRTEY

This Australian firm made the first delivery by drone in the US, dropping 4.5kg of medical supplies at a remote clinic over the course of three trips, under the careful watch of the Federal Aviation Authority. The trips each took three minutes with the hexacopter drone, which has a range of ten miles and lowers cargo to the ground using a line, like Google's Project Wing.



STARSHIP TECHNOLOGIES

These robots cover the "last mile" of delivery, picking up packages from a local automated hub. Each robot can carry the equivalent of two grocery bags as far as 30 minutes away, travelling on pavements. Nine cameras help it see and stop if someone is in the way, with humans overseeing its progress.



FLYTREX SKY

A quadcopter-style drone, the Flytrex is cloud-connected, so you can track it over GPS, and it can send notifications over 3G. It weighs 1.25kg, can travel at 20m per second, and cover 11km with a 2kg package.





ROBOTS: START YOUR ENGINES

Formula E will feature driverless cars for the first time next year. Is this the future of sport?



Top athletes function like machines, but as of next year we'll get to see if the machines can keep up.

During the 2016-2017 season, Formula E – the electric version of Formula 1 – will run a race with automated drivers for the first time. The Roborace will cover the same circuit as Formula E races, taking place before normal cars roll onto the track.

Ten teams will compete over the one-hour races, each using the same model of driverless car, with every team developing its own real-time algorithms and AI systems. One of the teams will be a crowdsourced community team that's open to "enthusiastic software and technology experts all over the world," Formula E said in a statement.

Denis Sverdlov, founder of Roborace



and automotive startup Kinetik, said the races will "show the advantages" of driverless systems and "push the development of the technology".

Formula E is the perfect place to test self-driving vehicles and trial automation, said Dr Chris Brauer, director of innovation at Goldsmiths, University of London. "High-performance racing is an ideal testbed for driverless cars," he told PC & Tech Authority. "The rules are clear and competitive advantages are gained through efficiencies. This suits the ruthless nature of learning algorithms."

Modern sport isn't only about the game itself, but the narrative around athletes and the hurdles they overcome. Can algorithms ever capture the imagination?

"These cars will lack free will, but they will more than make up for it in personality," said Dr Brauer. "Some will be programmed for

maximum risk, while others will opt for pragmatic opportunism. These kind of characteristics are at the essence of what attracts fans to drivers."

Automation threatens some careers more than others, but while repetitive jobs that require accuracy are

perfect for machine employees, they make for dull robot athletes. "Automating precision sports such as archery or table tennis is not really entertaining," said Dr Brauer. "Perfection can be boring and lack the unexpected. In the next wave of automation, combat and extreme sports have the necessary spectacle to keep fans engaged with AI."

The Roborace isn't the first machine sport: the RoboCup for football-playing robots has run since 1997. The organisers believe a robot football team could beat humans by 2050. Will autonomous cars ever outrace human drivers? Dr Brauer thinks so. "Vibrant AI vehicles will make egocentric but fallible human drivers seem dull and heavy – and slow."



WHAT IS...DIAMOND NANOTHREAD?

Forget graphene. Diamond nanothread is the material that's getting scientists excited about the potential for new devices, technologies and even space lifts

We've been hearing about graphene changing the world of technology for years, although we're yet to actually see a breakthrough. Now, the carbon-based wonder material is already at risk of being overtaken. Two months ago, we wrote about carbon nanotubes – an incredibly strong, rolled form of graphene – but this month's clever material is potentially just as strong and light: diamond nanothread.

What is diamond nanothread?

It's not the same as the rock on your finger, but there are similarities. The gems are the result of carbon atoms being pressed together, while the "diamond" in this material is made by stacking benzene molecules and compressing them to create strings of carbon. The molecules form a structure similar to diamond, with the benzene atoms linking in an unexpected and strong way.

It's a material that's incredibly light and thin – at only a few atoms across, it's hundreds of thousands of times thinner than

optical fibres – but also as strong as carbon nanotubes.

What can you do with it?

It could be used to create lighter, stronger and smaller devices. Aside from nanotechnology, that could include cars that weigh less, require less fuel and release fewer emissions, noted scientists from Penn State University. But that's less interesting than their other potential use: super-strong, lightweight cables that could be used to make a "space elevator" – a lift that would carry people into space without using rockets. This was first mooted in 1895, but has remained science fiction ever since.

It's now possible to attach different molecules around the carbon and hydrogen core – so existing materials could get a stronger atomic core.

What's holding this back?

It's not easy to make diamond nanothread: the benzene must be compressed in a particular way, which has only been

achieved in Penn State's own lab. The space elevator may also stay a fantasy, as the threads may become brittle beyond certain lengths.

But discoveries at the Queensland University of Technology may still overcome that problem. By modelling the structure of diamond nanotubes, they realised that integrating defects into the strings made them less brittle. It may sound counter-intuitive, but the weak points act as hinges, increasing the flexibility of the nanothread.

This means the material could soon be attracting the attention – and funding – that graphene enjoys.

Are people really trying to build space elevators?

Unbelievably, yes. Canadian firm Thoth Technology has filed a patent for the ThothX Tower, which uses a space elevator to pull people 20 kilometres up. Astronauts could then head into orbit via a spaceplane, departing from an inflatable spaceport, and tourists can take in the amazing view.

FUNKY SCIENCE

Here are the top stories from this month on the innovations that are just over the horizon.

HOW TECH HELPS OLYMPIC ROWERS WIN GOLD

You'd think that, having been a sport since the days of Ancient Egypt, there would be little more to learn about rowing. However, the tech team at British Rowing is fitting sensors to measure a boat's force, angle to the water and acceleration to shave tenths of a second from each stroke. "There's a lot of talk of marginal gains in sport at the moment, but if you're taking 200 strokes per race, it suddenly becomes quite a significant margin," Jamie Thomas, a biochemist and performance analyst told us. However, the telemetry sensors aren't allowed to be used in races, so we'll have to judge their success with medal counts.



THE CANINE HEROES OF SOVIET SPACE

When Soviet scientists needed to test the effects of space travel on animals before sending humans into orbit, they first turned to monkeys – but two-thirds of them died. Next, they tried dogs in the hope they could better cope with the stress. Trained as canine cosmonauts and dressed in special spacesuits which also acted as an in-flight pooper scooper – the mutts helped make space travel possible for us humans. Former street stray Laika became the first animal in orbit, but didn't make it back to earth after overheating inside the capsule. She was never intended to survive the return trip – a source of regret for Oleg Gazenko, who worked on the project. Alpr explored the canine heroes' stories.



LIVE FOREVER – DIGITALLY – WITH HUMAI

Why die when your consciousness can live on in a fake body? That's the idea behind Humai, although it's unclear how much of the idea is science and how much is fiction. The startup is offering artificial intelligence to analyse and store clients' conversational style, behavioural patterns and more, with the aim of planting their brain in an artificial body. If that sounds unlikely, Humai itself admits it will be at least 30 years before the technology is in place for such resurrections, but critics of the project say it'll take far longer than that – if it's ever possible.



CROWDFUND THIS! SWAPBOTS AUGMENTED-REALITY TOYS

Our pick of tech projects on Kickstarter and Indiegogo

Do children need augmented reality?

What's wrong with their imagination? SwapBots aim to "bring our imaginations to life" via little toys that can interact with a mobile game. Children can mix and match the three bits – head, body and base – that make up the characters, giving their player different skills and special moves for the in-game battles. It's like Mortal Kombat, but less violent, and your little one gets a plastic toy to display on their shelf and play with outside of the game, too.

Sounds fun.

We hope the gameplay is also interesting enough for adults. The app is free, so those who don't have their own collection of SwapBot toys can nick – er, borrow – the players from their child's shelf.

Only fair, as it's us adults who will be paying for the plastic bits.

Indeed, and this being a modern toy, there are characters who are deemed "collectible". If this gets funded and piques the interest of your son or daughter, expect to have to shell out for the whole collection so your little gamer can have the full range of skills in-game. It's in-app purchasing for the real world.

Time to start saving then. So far, there are only six Bots being developed, which you can pick up on Indiegogo for US\$40 plus shipping. Otherwise, they're US\$9 apiece. The developers say these are the "initial" collection, so expect more to be made if the project gets funding. While the first – limited edition – run are generic animals, it's easy to see the developers cutting a deal for branded characters. Get Elsa from Frozen in there, and we'll hand over our card details. If that doesn't happen, you can create a bespoke Bot by pledging US\$2,200. Of course, you'll also need a smartphone or tablet to play – with iOS 6 or Android 4.2 and above.

Will this get backed?

SwapBots has a good chance. At the time of writing, the project had picked up 31% of its \$100,000 goal, with a solid 40 days left to go. The Bots will ship in June 2016.



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INSTRUCTIONS: Open Windows Explorer,
navigate to your DVD drive and double-
click Index.html in the root directory. **DISC
PROBLEMS:** To replace faulty DVDs, please
send the discs to: PC&Tech Authority DVD
Replacements, Level 5, Building A, 207 Pacific
Highway, St Leonards NSW 2065

Make sure to include your name and postal address on the back of
the package so that we know where to send the replacements. For
all other DVD related issues email cd@pcauthority.com.au. As
the delivery platform only, PC&TA and Haymarket Media cannot and will
not provide support for any of the software or data contained on these
discs. Although all discs are virus scanned, Haymarket Media cannot
accept any responsibility for any loss, damage or disruption to your data
or computer system that may occur while using the discs, the programs
or the data on them. There are no explicit or implied warranties for any
of the software products on the discs. Use of these discs is strictly at
your own risk.

FULL VERSION

ASHAMPOO BURNING STUDIO 2016

Ashampoo Burning Studio 2016 is a free
disc burning suite with some interesting
extras.

The core of the program works much
like the competition. Choose your project
type - a data disc, maybe an audio CD -
then drag and drop your source files onto
the interface, and you can be burning
your CD, DVD or Blu-ray disc in a couple
of clicks.

But Burning Studio can also create
Autostart discs, which display interactive
menus that appear when the disc is
inserted. These can launch files or
documents, send an email, link to a web
page and more, and are a great way to
present information to the recipient of
your disc.

Image handling is another plus, with
tools to burn images (ASHDISC, CUE/
BIN, ISO, IMG), browse them, or create
images from files or other discs.

If you're looking to burn audio CDs then
you'll appreciate the wide file format
support: MP3, WMA, OGG, APE, OPUS,
FLAC, CDA and WAV.

There's also a simple file backup tool,
a cover designer, and a disc copier, and
there are some advanced tweaks for
experts (set file system, boot options,
more).

REGISTRATION & INSTALLATION:

- Download and run `ashampoo_burning_`
`studio_2016_22287.exe`
 - After you launch the software, a prompt
will be appear requesting you to register.
 - Click on "Get free activation key",
this will open up a link in your default
internet browser.
 - Enter your email and hit the "Request
full version key".
 - Note: Users who have previously
registered an Ashampoo product,
please log in.
 - Once you have logged in, go back
to within the application and click
"Request FREE full version key" again
and fill out the prompts accordingly.
 - Copy and paste your license key into the
application, press "Activate now!" and
complete the installation process.
 - Congratulations! You have unlocked
Ashampoo Burning Studio 2016
- For support of this software, please direct
your queries to: <https://www.ashampoo.com/en/aud/sup>

REQUIREMENTS:

- Windows Vista, 7, 8, 10 32/64-bit
- 50 MB hard drive space

LIMITATIONS:

- Registration required.
www.ashampoo.com/

FULL VERSION

CYBERLINK POWERDIRECTOR 12 LE

PowerDirector 12 is a comprehensive
video editor which is also extremely easy
to use, and supports many different ways
to present and share your media.

This starts with a capable slideshow
creator. Import your favourite photos,
and choose a slideshow style ("Camera",
"Normal", "Motion"). Preview the
slideshow to see its animations and
effects, and when you're happy, export
the results as a video (AVI, WMV, MP4,
more).

An "Easy Editor" works in a similar
way, only it accepts video clips as well
as photos. Choose your source files,
drag and drop to reorder them, select a
custom style and preview the finished
results. Again, your production can be
saved as a video, ready to share with
others, in just a few clicks.

If you need more control, though, the
real power is in the full editor. Here you're
able to import all the images and videos
you need, before organising them on a
multitrack timeline.

You can then trim your clips. Split them
into separate scenes. Maybe improve
them to fix lighting problems, stabilize
shaky footage, remove video or audio
noise. And there are a host of tools to
adjust exposure, brightness, contrast,
hue, saturation, sharpness, vibrancy and
a whole lot more.

REGISTRATION & INSTALLATION:

- Download and install
`PowerDirector_3617_LE_LE_VDE141125-`
`03.exe`
 - While you wait for the installation to
complete, point your browser to: [http://](http://pdr12.disc.pcauthority.com.au/)
pdr12.disc.pcauthority.com.au/
 - Once the website has loaded, create or
login to your account and register for a
serial key. You will need this to register
your copy of Power Archiver 2015.
- For support of this software, please direct
your queries to: <http://www.cyberlink.com/support/index.html>

REQUIREMENTS:

- Windows Vista, 7, 8, 10 32/64-bit
- 500MB hard drive space

LIMITATIONS:

- Registration Required:

www.cyberlink.com/

12 MONTH FULL VERSION**PASSWORD BOSS**

Password Boss is a powerful password manager which can create, sync and manage logins across all your devices.

Setup is generally easy, because the program imports any passwords already stored by your browsers: there's no need to enter them all again.

Password Boss's browser extensions (Chrome, Firefox and Internet Explorer) provide speedy access to any of your password-protected sites, but you can also just follow a link or enter a URL as normal.

Whatever method you choose, Password Boss fills in the login form automatically with your stored credentials.

When you create a new account, Password Boss can help out by generating a secure password, reducing the chance you'll be hacked in future.

Unusual extras include a "sharing" feature, which enables logins to be securely shared with others, permanently or for a fixed period of time only.

A "secure browser" allows users to browse the web in an isolated environment, reducing the chance of malware intercepting your details. And it remembers and enters your payment details, including credit cards, speeding up transactions on your favourite shopping sites.

Best of all, this power isn't restricted to the PC version: your passwords may also be accessed, shared and managed from the Password Boss iOS and Android apps.

REGISTRATION & INSTALLATION:

- Download and install Password_Boss_Setup.exe
 - During the installation process, you will be prompted to enter your email to obtain a 12 month upgrade. Enter in your email and select "Request free upgrade". You do not need to wait for an email, complete the installation process.
 - You will also need to create an account upon running the application.
- For support of this software, please direct your queries to: <https://www.passwordboss.com/support/>

REQUIREMENTS:

- Windows Vista, Windows 7, Windows 8, or Windows 10
- 30 MB hard drive space

LIMITATIONS:

- 12 months license, registration required.:

www.passwordboss.com/

12 MONTH FULL VERSION**WATCHDOG ANTI-MALWARE**

Watchdog Anti-Malware is a smart tool which uses multiple antivirus engines to detect threats your regular security software might miss.

It's all very easy to use. To get started, just select the "Smart" (quick) or "Deep" (thorough) option, click "Scan", and watch as Watchdog Anti-Malware goes to work.

The program crawls over your hard drive, and when it finds something suspicious, passes a fingerprint (not the whole file) to its cloud scanner for further analysis.

Watchdog Anti-Malware's "Cloud Scanning Platform" then checks your file using multiple antivirus engines, ensuring you'll detect threats that individual packages might miss, before returning its verdict to the program.

When the scan is complete, you can browse the report, choose to delete individual items, quarantine them, maybe exclude them if you're sure they're safe, before cleaning up your entire system with a click.

REGISTRATION & INSTALLATION:

- Download and install WAMDownloader.exe
 - While the software is installing, point your browser to: <http://watchdog.disc.pcauthority.com.au/>.
 - Create or login to your account.
- Once you have logged in successfully, you will be presented with your code.
- To apply your serial code, click on the "key" icon found in the top right hand corner, copy and paste your serial and click on the "Activate Now" button.
- For support of this software, please direct your queries to: <https://www.watchdogdevelopment.com/en/support>

REQUIREMENTS:

- Windows XP, Vista, Windows 7, Windows 8, or Windows 10
- 50 MB hard drive space

LIMITATIONS:

- 12 month, 1-PC license, registration Required:

www.watchdogdevelopment.com/

FREE FULL VERSIONS: Each month, we offer *PC & Tech Authority* readers full registrable versions of some software on the DVD. See the installation instructions in the DVD menu to complete registration, if applicable. **IMPORTANT:** Full product registration closes on 14/03/16



DVD CONTENTS

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FEATURE + PASSWORD BOSS + ASHAMPOO BURNING STUDIO 2016 + WATCHDOG ANTI-MALWARE+ CYBERLINK POWERDIRECTOR 12 LE DRIVERS + ATI CATALYST + NVIDIA FORCEWARE HELP + DISCLAIMER + DAMAGED OR FAULTY DVDS + USING THIS DVD + INSTALLING SOFTWARE EDITORIAL + BURNING AN ISO IMAGE + PC&TA EDITORIALS TROUBLESHOOTING + SERIAL CODES + BLANK REGISTRATION WEBSITE + CAN'T FIND A FILE? + INSTALLATION ERROR WINDOWS + CCLEANER + CLASSIC SHELL + CUTEPDF + DEFRAGGLER + FOXIT READER + GREENSHOT + APPLE ITUNES + LIBRE OFFICE + OPEN OFFICE + MALWAREBYTES' A/M + SANDBOXIE + VLC MEDIA PLAYER + FLUX + 7ZIP MAC + ALFRED + BETTERTOOLSTOOLS + APPLE ITUNES + DROPBOX + FLUX + GOOGLE CHROME + MOZILLA FIREFOX + PLEX + SKYPE + TEAMVIEWER + VLC INTERNET + VUZE + DROPBOX + GOOGLE CHROME + MOZILLA FIREFOX + MOZILLA THUNDERBIRD + SKYPE + STEAM LINUX + LINUX MINT

INSTRUCTIONS: Open Windows Explorer, navigate to your DVD drive and double-click Index.html in the root directory. **DISC PROBLEMS:** To replace faulty DVDs, please send the discs to: *PC&Tech Authority* DVD Replacements, Level 5, Building A, 207 Pacific Highway, St Leonards NSW 2065

Make sure to include your name and postal address on the back of the package so that we know where to send the replacements. For all other DVD related issues email cd@pcauthority.com.au. As the delivery platform only, PC&TA and Haymarket Media cannot and will not provide support for any of the software or data contained on these discs. Although all discs are virus scanned, Haymarket Media cannot accept any responsibility for any loss, damage or disruption to your data or computer system that may occur while using the discs, the programs or the data on them. There are no explicit or implied warranties for any of the software products on the discs. Use of these discs is strictly at your own risk.



JON HONEYBALL

"DELL COMMITTED THE CARDINAL SIN OF ALSO PROVIDING THE PRIVATE KEY PART, SO ANYONE COULD CREATE FALSE CERTIFICATES"

The company put in place a system that ensures its eDellRoot clanger is reinstated against my will. This must be viewed as a hostile action

I decided I needed a new pair of test laptops for the office – something that would be well built and last a good three years in the daily grind. It was, of course, tempting to go for one of the plastic-fantastic, super-cheap devices on offer, but their build quality leaves everything to be desired. Instead, I decided it was time to buy some new Dell XPS laptops. I've bought Dells in the past and have been very happy with them. After the Dell era, we went through a phase of only buying Samsung, notably its Series 9 devices, which were quite tasty. However, Samsung appears to have disappeared from the laptop market, so that option was no longer available.

On scanning Dell's website, my eyes fell on the Dell XPS 13, a solidly built laptop that could be delivered with a pretty reasonable specification of 8GB of RAM, a 256GB solid-state disk, a decent 13.3in 1,920 x 1,080 Infinity Edge display, and all of the usual connection goodies, including Bluetooth 4.1. At a price of \$1,999 per device, this seemed like a reasonable investment. Along with the machines, I added a couple of useful (optional) adapters – one USB Type-C to HDMI 2, one USB Type-C to USB 3.

After a long wait, the devices arrived and proved to be just what I was expecting, with a build quality that, while still some way below Apple's finest, certainly looked much better than the efforts of other vendors (picking up certain laptops by the side of their keyboard can cause sufficient chassis flex to make their casework pop apart). Then I read the news wires, which told me about Dell's installation of the eDellRoot root CA certificate, stuffed into the Windows

certificate manager. I checked my shiny new laptops and there it was, displaying itself for all to see.

To spot this item, run `certmgr.msc` and open up the "Trusted Root Certification Authority" folder, "Certificates" and hunt for eDellRoot. Why not delete it? It seems like an easy thing to do. You kill it off, reboot your computer, go back into the certificate manager and guess what? It's reappeared, as if by magic. It turns out that there's a special chunk of Dell code that does this for you, called "Dell.Foundation.Agent.Plugins.eDell.dll". You need to kill this, too.

Why does this stuff exist? Well, it seems that Dell loved the idea of

"enhancing the user experience" by including a tool that can hand over information such as your machine's service tag, so they wrote a system to do just that – and decided to encrypt it using their own key. However, they committed the cardinal sin of also providing the private key part, which means any malicious person could use it to create false new certificates. That's exactly what you'd need if you were preparing the ground for a man-in-the-middle attack, for example, against an airport terminal or a coffee shop. It would allow you to decrypt someone's encrypted SSL traffic, assuming they were using a similarly afflicted Dell laptop, and even an SSL connection for something such as online banking.

When the balloon went up, Dell

✓ Thankfully, the Dell site has a page describing how to remove the certificate from your computer

Information on the eDellRoot and DSDTestProvider certificates and how to remove them from your Dell PC

This article provides information on the eDellRoot and DSDTestProvider certificates and how to remove them from your Dell PC.

Information on the eDellRoot and the DSDTestProvider certificates

The eDellRoot certificate was installed on Dell PCs by our Dell Foundation Services application, and is used by support to provide a better, faster and easier support experience for our customers. The certificate is not malware or adware. It was intended to provide the system service tag to Dell online support allowing us to quickly identify the computer model, making it easier and faster to service our customers. This certificate is not being used to collect personal customer information. It's also important to note that the certificate will not reinstall itself once it is properly removed using the recommended Dell process.

When we became aware of eDellRoot, we immediately dug into all our applications that get loaded on Dell PCs. We can confirm we have found no other root certificates on the factory installed image. What we did find was that the Dell System Detect application and its DSDTestProvider root certificate had similar characteristics to eDellRoot. In the case of Dell System Detect, the customer downloads the software proactively to interact with the Dell Support website so we can provide a better and more personalized support experience. Like eDellRoot, the support certificate in question was designed to make it faster and easier for our customers to get support. The impact is limited to customers who used the "detect product" functionality on our support site between Oct. 20 and Nov. 24, 2015. The application was removed from the Dell Support site immediately and a replacement application without the certificate is now available. We are proactively pushing a software update to address the issue and have provided instructions to remove this certificate below.

How to remove the eDellRoot and DSDTestProvider certificates from your system

Follow the instructions below to remove the eDellRoot and DSDTest certificates from your system. Please note the following additional information about the removal of the eDellRoot certificate from Dell PCs:



JON HONEYBALL

Jon is the MD of an IT consultancy that specialises in testing and deploying hardware
@jonhoneyball

shuffled its feet and claimed it wasn't a serious goof, saying that:

"The certificate was implemented as part of a support tool and intended to make it faster and easier for our customers to service their system. Customer security and privacy is a top concern and priority for Dell; we deeply regret that this has happened and are taking steps to address it. The certificate is not malware or adware. Rather, it was intended to provide the system service tag to Dell online support allowing us to quickly identify the computer model, making it easier and faster to service our customers. This certificate is not being used to collect personal customer information. It's also important to note that the certificate will not reinstall itself once it is properly removed using the recommended Dell process. We have posted instructions to permanently remove the certificate from your system. We will also push a software update starting on 24 November that will check for the certificate, and if detected remove it. Commercial customers who reimaged their systems without Dell Foundation Services are not affected by this issue. Additionally, the certificate will be removed from all Dell systems moving forward. Your trust is important to us and we are actively working to address this issue."

That's okay then, I like to feel trusted. Let's not mention that Lenovo got roasted earlier in the year for using the Superfish malware, which it built into the UEFI firmware of the laptop so that it would reinstall itself, even if you'd wiped your whole hard disk and installed Windows afresh. You might have expected that Dell's management

would have taken note of this debacle and decided that doing anything dodgy with certificates was a bad idea, but no, apparently they decided it was just tickety-boo – until it got spotted.

Please take careful note of that phrase "unintentionally introduced a security vulnerability". Anyone with even a quarter of a functioning brain cell would know that introducing SSL certificates into a machine must be done with the utmost care, because the consequences of getting it wrong can be catastrophic.

But there's more – it turns out that there's another root certificate! Why make do with one when you can have two? The DSDTestProvider certificate is installed (and reinstalled) by Dell's own utility software tool, called Dell System Detect, and it also comes with a visible private key. You couldn't make this up. Thankfully, Dell has provided an updated page, which describes how to erase it from your computer.

I feel Dell's pain, even if only ever so slightly. The company wanted to provide a good customer experience by bundling Dell-branded tools to help in the support arena, and that's honourable. I could flatten my shiny new XPS 13 devices and install a virgin copy of Windows 10 Pro from a USB stick, but I feel I would be missing out. First, I'd be needlessly spending money on second Windows

licence but, more importantly, I'd no longer have the support tools supplied by Dell, tools that might check for new firmware or XPS 13-specific drivers. I might want to have those things, but what I don't want is a cack-handed, mind-numbingly stupid certificate cock-up of truly intergalactic proportions perpetrated across my laptop. I took to Twitter and vented my wrath at Dell, who replied "we deeply regret that this has happened and are taking steps to address it". No, I'm not reassured by this, and I doubt that you are either.

So where does this leave us? I can cope with PC vendors who bundle unwanted, part-installed copies of Norton or McAfee antivirus onto my machine, because we all know they're paid

to put them there. It's only a 30-day trial version, and let's ignore the fact that I'd prefer to make my own decisions about what malware software to use (while reminding myself that I don't need to do this on my iPad Pro) – I know I can click into Add/Remove Programs, and rip the thing out. It's a different matter when certificates are stuffed into my core Windows certificate store – they're unsafe. Moreover, there are applications running that will forcibly shove them back in again should I be so rash as to remove them. I have to conclude that Dell has placed itself on my "people I don't want to party with" list. Not only did it screw up, but it put in place a system to ensure its clanger is reinstated against my will. This must be viewed as a hostile action.

Here's the problem: almost every Windows PC user has no idea that this is going on. We don't go scouting around the certificate store to see what nasties might have been put in there by reputable firms such as Dell – we assume that our shiny new device is pristine. In a business context, we might flatten that device and reinstall a new custom image, or avail ourselves of the facility to have shiny, new devices delivered to our company preconfigured by Dell (probably with this unpleasantness installed, just to be helpful).

Yes, I'm steaming mad about this, but I'm not quite sure what I should do.



"I checked my shiny new laptops and there it was, displaying itself for all to see"





Should I box them up and send them back to Dell, demanding a refund as “unfit for purpose”? That’s certainly tempting. Or do I just use the Dell tool to remove the nonsense from my computer and hope that there isn’t more buried in there? Do I take the money and buy a few Microsoft Surface Pro 4s? I have one here and it’s an impressive piece of technology, and the OS installed on it is pure Redmond with no added junkware. Or do I blow away my new computer with a newly purchased USB stick of Windows 10, be happy that it has no Dell rubbish installed on it and live with the fact that I’m losing some useful update facilities? And then I am, of course, reminded of Lenovo’s masterpiece in this type of farce, which included a malware installer programmed into the UEFI firmware. Would a freshly installed Windows 10 actually be any safer? The temptation to regard Windows 10 running on Microsoft Surface hardware as a seamless, vertically integrated stack, just as we do with OS X running on Macs, is strong.

It pains me to see the PC ecosystem implode in this way, but it’s clear that there’s a whole tier of middle management at Dell that needs to be fired. Or should I revisit my ISO installation image of Linux Mint? The bottom line is that Dell has dropped the ball very badly here, and I’m not impressed.

APP STORE CERTIFICATE

Speaking of certificates, how many of you were knocked sideways by one of Apple’s certificates timing out? The one used for signing applications in the App Store for OS X? It seems that someone wasn’t paying attention and this certificate simply expired without being replaced. It was issued on 11 November 2010 at 21:58:01 and expired on 11 November 2015 at 21:58:01. The end result of this was that applications that you had bought, paid for and were happily running on your desktop suddenly decided that they weren’t the real thing and that you should download them again. Actually, you needed to reboot your computer to flush the certificate cache or run a command line to kill the process.

Although this isn’t quite in the same league of annoyance as the Dell debacle, it’s a problem when your app stops working, and certainly dents trust in the App Store. It’s an intrinsic part of the design, of course, that there are certificates to prove that good things are good and that bad things are bad – this is part of the way the operating

system tells that a bad app is not to be trusted, because it’s not “blessed” by the correct Apple certificate. However, it’s an incredibly important business process to know when your certificates were issued and will expire, and to ensure that they’re handled in an efficient way with no hiccups. I suspect that shouting happened at various people at Cupertino, and that there’s been a serious and thorough overhaul of their core certification procedures. That’s what I’d like to believe. Can you tell that I’m having a very bad month?

“There needs to be a new class of optimised applications to really make the iPad Pro sing”

IPAD PRO

I have to mention the iPad Pro. I first heard rumours of a 12-13in iPad with a 4K screen well over two years ago, but it was hard to know why Apple held off from shipping it. I can suggest some possible answers: the yield on the screen would have to be manageable before Apple could launch it, otherwise the production cost would be prohibitive and there would be only tiny numbers of products available in the channel. With the iPad Pro, Apple has pushed the CPU/GPU technology right to the edge and delivered performance similar to a solid desktop or high-end laptop. That required waiting for these chips to reach fruition. Moving around a 4K screen’s worth of image in real-time while doing all the GPU stuff is a tough problem, and it would have been mad to come to market with a half-baked product.

I’m very impressed with what they’ve delivered, even if my wallet is somewhat bruised by the cost of the device, Apple Pencil and Smart Keyboard. For certain users, this will be a truly killer platform, and it’s easy to work out who they are. In essence, it will be those people who don’t need full-power Microsoft Office and can slum it on the half-cooked iOS versions, or those who use graphics apps that are available on iOS. Or musicians working with active user interfaces into mixing desk capabilities. There needs to be a new class of optimised applications to really make the iPad Pro sing. If this happens, the product and platform will be transformative.

However, there’s one thing I don’t understand. The iPad Pro is more

than capable of running the Apple iOS development platform, so why are there no self-hosted development tools for iPad Pro? It could become the killer iOS development platform, but it needs the toolsets to be ported over from Intel OS X. Maybe Apple has something lined up and I sincerely hope that it sees the same need as me.

If you just want a bigger iPad, it’s hard to justify the iPad Pro’s cost, but if you have tasks that fit well on the larger screen size, along with the Smart Keyboard and Pencil, it’s amazing. Ending up as a larger movie player for intercontinental flights would be a miserable fate for something that can deliver so much more.

RØDE I-XY

A small shout-out (I believe that’s the modern vernacular) to Røde microphones for their lovely i-XY product. This is a proper high-quality stereo microphone that connects to your iPhone or Pad using the Lightning connector. Røde is a hugely respected manufacturer of serious microphones, from the “prosumer” level right up to studio mikes that can challenge the best of Neumann, Schoeps and Royer. The i-XY comes in a nice case, and there’s bundled software that lets you record at seriously good resolution and bit depths. A small amount of money buys you the professional version of the software, and it’s worth it.

For extending the functionality of an iPhone, this is a killer tool: these are serious microphones that help lift the phone into another working area. Of course, it would be entirely irresponsible and wrong of me to suggest that it would make a great device for bootlegging concerts, but, for musicians, it’s a convenient way of making high-quality recordings of their work for a small price (around \$200). I carry mine with me most of the time and am surprised how often I use it. That, in my mind, is a clear indication of the product’s value. ●



➤ Ending up as a larger movie player for long flights would be a miserable fate for the iPad Pro

PAUL OCKENDEN

"OVER FIVE YEARS, MOBILE DEVICES HAVE RISEN FROM 3% OF WEB TRAFFIC TO BECOME THE MAIN SOURCE"

Building a mobile- and tablet-friendly website can be challenging. Here are the tools and techniques you'll need

Some readers may be aware that my day job is building websites and web-enabled business tools, mostly for large companies. It's great work because it's impossible to get into a rut – things constantly change, meaning our skillset and working practices must keep evolving at an incredibly rapid pace. We run just to keep up, and I sometimes joke that if I were to go away on holiday for a couple of weeks, I'd be completely out of the loop. Every week it seems there's a new technology, technique or trend. Design seems to be the most fickle: one minute all sites have to have round corners, then, before you know it, they're square again. People used to pack lots of content into any available space, then sites became very spread out and scrolly, with loads of blank space, and now people are starting to push most content above the fold again, realising that visitors will move on rather than scroll down.

Technologies also change. The web agency used to create and host as much of the site as possible, but now the trend is to use lots of externally hosted components when building the website. So, rather than creating your own search system, you might use a tool such as Algolia. The same goes for contact forms, room or table booking, fonts and maps. Before you know it, a website is just stylish glue holding externally hosted widgets together.

This approach also brings dangers. A site built from many components will, by definition, also have many individual points of failure. At any given time, there will be a greater chance that your website is broken. There's also the worry about what happens if a key provider goes wrong. If it was conventionally hosted server software, you'd be able to continue using it, but that's not possible

when an online provider goes to the wall, or decides to pull out of the market. This happened last year when Extensis discontinued its font service, Weblnk. You might think something like that would be no big deal, but it caused us a real headache because some of the fonts used on our clients' sites weren't available from other providers such as Google Fonts or Adobe Typekit.

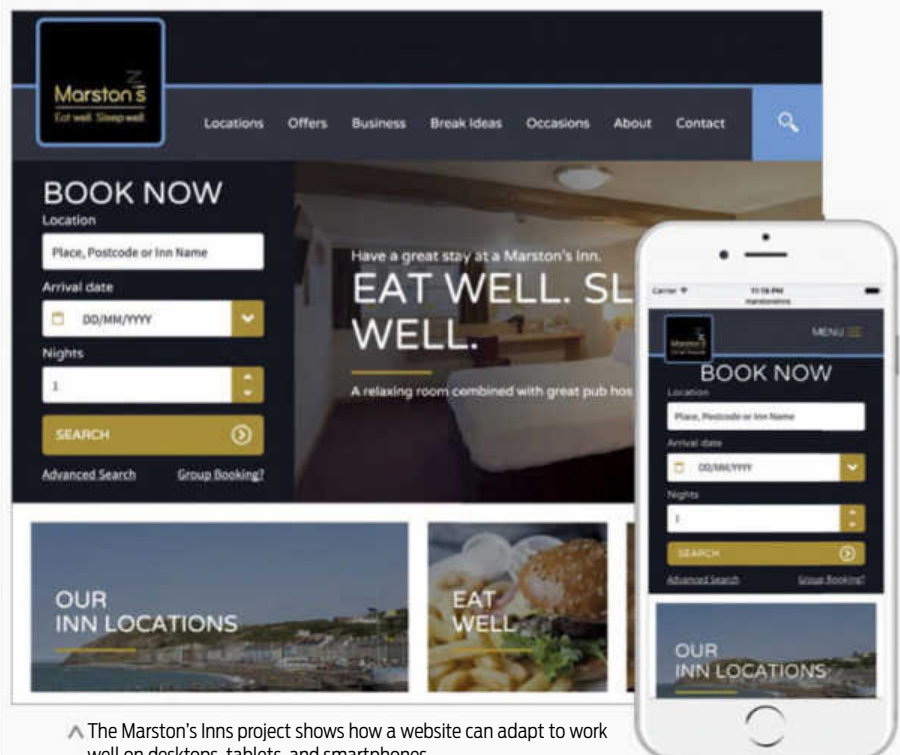
As a website owner or developer, you have no control over such matters – they just sneak up and bite you on the bum. However, there are changes in user tastes and behaviours that you need to adapt to, and these can catch you unawares, but not because they happen quickly. Quite the reverse.

One such slow change has been the rise of mobile browsing. I've been flicking through the stats for one of the sites my company manages and hosts. Five years ago, the proportion of website traffic coming from mobile users was just

under 3%. A year later, it was 8%, then 11%, 31%, 43% and, finally, today on that same website I'm seeing 52% of sessions coming from phones and tablets. Isn't that amazing? Over five years, mobile devices have risen from 3% to become the main source of web traffic. The difference between then and now is huge, but the change over the half decade has been gradual. It's not like we suddenly found everyone had switched to mobile browsing.

Trends present some interesting challenges. For starters, what should be your primary design target? You might argue that, if over half of your website visitors are now using mobile devices, you should concentrate your design effort on them, and simply expand the framework to laptops and desktops. This is known as a "mobile first" approach.

It works, and works well – for some market segments. If I was creating a website for a train company, I would



▲ The Marston's Inns project shows how a website can adapt to work well on desktops, tablets, and smartphones



PAUL OCKENDEN

Paul owns an agency that helps businesses exploit the web, from sales to marketing and everything in between @PaulOckenden



adopt this approach because mobile users are the key demographic. But real-world experience is that, for most companies, despite the desktop and laptop users now being a minority, it still makes sense to use the full-sized version of the website as the base for the design.

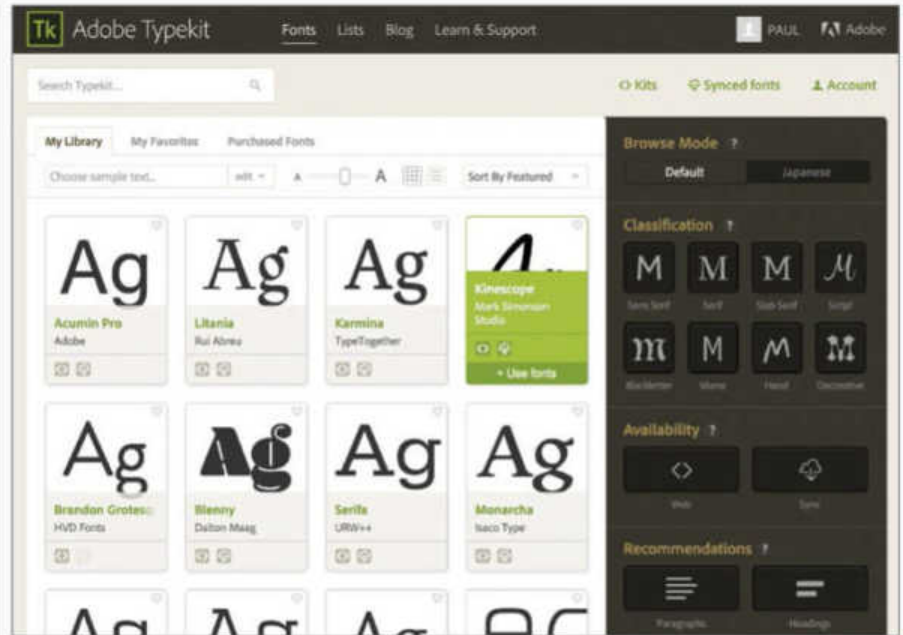
This is for a number of reasons. First, people with bigger screens will be more

“Before you know it, a website is just stylish glue holding externally hosted things together”

appreciative of good design than those with smaller devices. Your pixel-perfect layout and beautiful typography will look stunning on a large, possibly retina, screen. As you drop down to smaller sizes, despite often still having high resolution, the design intricacies will start to become lost. Secondly, tablet users are included within these mobile stats. There's a very fine line between design for desktop and for tablet. Even phones often come with huge screens these days, so the mobile version of your website doesn't have to be too stripped back. Lastly, from the agency point of view, the people who matter at the client – the chief executive, managing director or chief financial officer – will all inspect the website using a desktop browser. I know websites should be designed for the target audience, but in the real world, the person paying the bills is often more important.

People will talk about whether to use mobile-first design or not, but the very best designers don't see this as an either/or thing. They'll come up with a balanced approach, one that works well and looks equally stunning on huge or small screens, and anywhere in between. The key here is a technique called responsive design. A few years ago, you would have had a desktop site served up at “wherever.com”, and a separate mobile site at “m.wherever.com” (or even using a .mobi domain, although the fashion for those was very short-lived). Maintaining two different sites was a nightmare. Some content-management systems allowed you to enter text and pictures only once, spitting out content into fixed desktop and mobile templates, but this was never very satisfactory.

Responsive design does away with that. It serves up a single version of the website that adapts itself to the device being used to view it. At its simplest, this adjustment could simply be to the layout. A two-column site, for example,



▲ Adobe's Typekit is a brilliant way to bring stunning typography to your web projects

could drop down to a single column when viewed on smaller screens. However, responsive design goes way beyond layout: navigation may change completely, for example, changing to a style that's much easier to use on smaller devices (especially if the desktop navigation uses “hover” states, as these don't exist on tablets and phones). Images might change too, perhaps even leaving out graphics that were just used as “wallpaper” on bigger screens. Even the site content can adapt to the screen size. Take the example of a restaurant: someone sitting at their desk probably wants to see menus, photos of the dining area, and maybe interact with an online booking system. On the other hand, someone out and about on their phone probably wants an address, map, and phone number. Of course, the person on their phone wants menus too, and the person at their desk wants a map – it's just the relative priority of the information that changes. With responsive design, you can adjust the site content to suit the needs of the user.

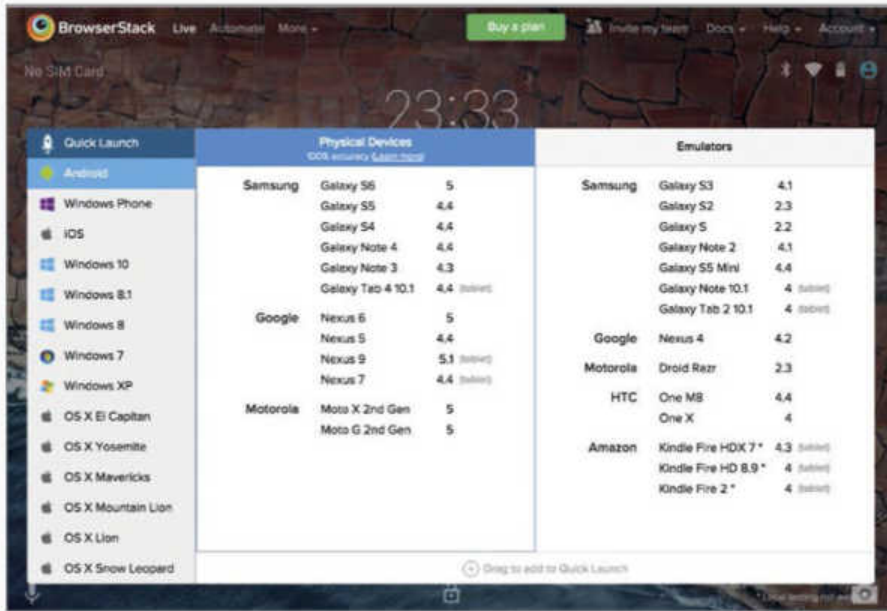
So how does all of this work under the hood? It's easiest to look at an example: marstonsinns.co.uk is a website that we've been working on recently (my company built it, while 383 Project did the user experience and design work). Look at the front page using a desktop or laptop. Start with the screen wide – you'll see grey bars down each side. Now drag the right-hand side in, slowly. At around 1,260 pixels wide, you'll notice the grey

bars disappear. Keep dragging inwards and you'll notice that the images shrink down proportionally, and the text that lies over the top of them starts to wrap in different places. If you scroll down the page to the Locations, Eat Well and Sleep Well boxes, you will notice that the text starts to fill the smaller boxes, so when we reach 1,200 pixels we remove it. Problem solved! We can do this because 1,200 is a “breakpoint”, and we can apply different CSS properties either side of it. In this instance, we just set the visibility on that text to be hidden.

Scroll back to the top again and keep shrinking your browser down. At around 992 pixels, you'll notice things jump around, as we hit the next breakpoint. In this instance, you'll see that, before the breakpoint, the “Book Now” panel was almost about to burst out of its box, so we reduced the font size. We also made the logo and header a bit smaller – we're in “large tablet” territory.

We're talking about “browser pixels”, which aren't necessarily the same as physical pixels, especially in this high-DPI world. Your iPad Air 2 might have a massive 2,048 pixels across, but in terms of “browser pixels” it only has 1,024. This is to ensure that web content doesn't end up in a space in one quarter of the screen!

Anyway, keep dragging the site smaller and you'll notice that, at 768 pixels wide, something radical happens. This is “phone size”. Even the massive iPhone 6 Plus only reports 414 x 736 pixels. You'll see that we've ditched the carousel, as it was just advertising space really. The navigation has completely changed, too – no longer across the top of the screen, it



BrowserStack offers a choice of native and emulated devices across all of the main mobile operating systems

opens when you press the three-line icon. This has become the de facto standard symbol for navigation on mobile-friendly websites. You'll also see that the previous four-column grid has now become single-column. There are other breakpoints in the design too, used for less dramatic changes.

The easiest way to accomplish an adaptive design is to build your website with a responsive front-end framework. This particular website uses Bootstrap, which was originally created by a couple of developers at Twitter. It's open-source and now has an active contributor network. We find it very easy to use, although there are other frameworks available.

There are two approaches. The first is a traditional approach, and involves creating designs for the breakpoints using layered Photoshop files, then slicing them up and hand-coding the CSS. This is quite labour-intensive, but it does allow for fine control and intricate layouts. The other approach is to use a responsive design tool such as the latest version of Dreamweaver or Edge Reflow, both by Adobe. These are great for mock-ups, and indeed for the production of simple sites. But in our real-world experience, they don't always allow the fine level of control that you sometimes need. If you find something doesn't look quite right when using an iPad on iOS 8.3, you're a bit stuck if you've used one of these more wysiwyg-style tools. But if you have built things using the "old-school" method, you can fire up Visual Studio and tweak..

This is one of the biggest problems you'll face when creating a responsive website. If you're only targeting users on desktops, you only need to worry about IE, Chrome and Firefox. Oh, and Edge. However, if you want your site to work across a range of mobile devices, there's no end of testing required. The best option is a test lab with lots of devices, but that's obviously very expensive to set up and maintain – especially if you want to include a wide range of devices.

The trouble is that you can't only rely on a single 7in Android tablet. An example of why is Samsung's Tab devices. To all intents and purposes, a Samsung tablet will appear to use the same browser as other Android devices, but Samsung seems to do something under the hood, tweaking the Android code. As a result, your website might not look the same as it does on similar Android tablets.

If you can't afford a comprehensive testing lab, there are a couple of useful alternatives. The first is your friends and family. Grab your co-workers' phones and tablets and test the site using those. Post a URL to a select group of friends on Facebook too – the beauty is that people can upload screenshots showing how the site looks on their device. You can get some great feedback this way.

The second option is to use an online testing service. At a really basic level, there are sites, such as browsershots.org, which allow you to see what your website looks like in a whole range of browsers, but it's pretty limited, and doesn't really cover the smartphone and tablet space. An alternative is browserstack.com, which doesn't just give you screenshots – it allows you to interact with the remote device. The service includes a whole

range of desktop browsers, as well as mobile devices. Some of these are emulated, but others are connections to actual devices. Sometimes this is the only way to properly debug a problem.

BrowserStack costs US\$39 per month if you use it on a month-by-month basis, or US\$29 per month on an annual basis. For a small developer, that may seem like a lot of money, but it's small beer compared to the costs we have in maintaining our mobile test lab.

I'll finish with a couple more issues you may face with responsive design. First, because the browser doesn't know how big images will be until they are loaded, a page can look a bit messy as it builds. This is because the main HTML will download, but can't display properly until all of the pictures are in place, so things jump around. It's a real problem on image-heavy pages. The solution is to take the first couple of images on the page, and create small file size (probably PNG) versions of them, in a neutral colour, but using the same pixel dimensions. Then, if you have an image tag like ``, change it to ``. This loads the lightweight image so the page can lay out properly, then load the real image in the background. That "this.onload=null" is to keep Firefox happy, by the way, as otherwise it'll continue to trigger the onload event each time the replacement image completes.

Another problem you may encounter is scaling images. Imagine you have two images across a page, one set to 33.3333% of the width and the other to 66.6666%. Together they should take up the whole width, but you'll find that not all browsers are created equal, and at certain screen widths, some will round the actual pixel sizes up while other browsers round down, leaving a one-pixel line in the middle. Safari seems to be the worst offender, although you'll also see it with Chrome on the Mac (Windows Chrome seems fine).

As with the jumping images problem above, if you're not using responsive design, you can fix this by specifying pixel sizes rather than percentages, but that won't work if you want the site to be responsive. The trick is to set the widths of the individual elements, images to 100.5% of their actual width in the CSS. This forces Safari to round the scaled widths up, not down.

I hope this column has given you inspiration and will encourage you to build a responsive website. Just don't get too good at it, eh? I don't suddenly want a load of new competition. ●



DAVID MOSS

"I WAS ABOUT TO TAKE MY KNOWLEDGE OF THE RASPBERRY PI TO NEW HEIGHTS - ROUGHLY 20 MILES HIGH, IN FACT"

Forget two weeks sunning yourself in the Med. How about launching a Raspberry Pi into space, along with some unsuspecting Lego figures?

Last summer was a busy one for me. Contrary to popular thought, for many school teachers the summer holidays aren't an eight-week jolly but a time for refilling knowledge banks and looking at new ideas.

My new ideas revolved around the Raspberry Pi, and I found myself in the privileged position of taking part in two major training opportunities. The first was to become a Raspberry Pi Certified Educator, a feat I achieved mid-July, and one I thoroughly recommend to any teacher thinking about doing any work with this brilliant little powerhouse of a computer.

A day or so after the course had finished I was in the doldrums. The days had been so full-on, so exciting and so enriching that I was at a real low. I retreated to my den, where I surrounded myself with jumper leads, add-on boards and the brilliant book *Adventures in Raspberry Pi* by Carrie Anne Philbin (education lead at the Raspberry Pi Foundation) and proceeded to embark on a veritable orgy of, how shall I describe it... I know, fun! Because that's what learning should be.

Glancing at the forums a few days later, I saw that James Robinson (education developer, Raspberry Pi Foundation) was offering a place on an upcoming course. I leapt at the chance and, following an amazing sequence of lucky events, was the final person given a place on the first ever Skycademy. Excited didn't quite cover it. I bounced everywhere like an overactive Tigger until the day finally dawned that I could leap in my car and head for Pi Towers, that haven of brilliance and geekdom.

So, why the excitement, you ask? I was about to learn how to take my knowledge of what could be done with the Raspberry Pi to new heights. Roughly 20 miles high, in fact. We were heading for near space, and what's not exciting about that?

The idea was sumptuously simple. Tie a Raspberry Pi with a camera to a weather balloon, add some GPS bits and an antenna or two, include a rather brilliant add-on board for near space, make serious use of polystyrene, sticky-backed plastic and some unsuspecting Lego figures, and then launch the whole shebang into space!

That was the easy bit. The hard bit was learning how to do it so that we had some chance of recovering the payload when it finally came back to Earth. How to track it, how to set it up so that all the different bits worked, and how to inflate it.

TEACHING THE TEACHERS

You might think that teaching other teachers is a scary prospect, but I've never found that to be the case. We teach because we enjoy the learning process, so as long as you know what you're talking about, you're not going to have any issues. When your name is Dave Akerman and you're a leading protagonist of all things

associated with high-altitude ballooning (HAB), and you're an engineer who can create most of the electronic add-ons needed to support the flights - oh, and you're a standout programmer too - you tend to find people like me hanging off your every word.

And hang we did. We needed to. Let's get one thing quite clear. Launching something into near space is trivial: fill a weather balloon with helium, attach a payload and let go. Getting it back in one piece, however, is quite another matter.

For a start, most aviation authorities around the world take a dim view of people randomly lobbing devices 100,000 feet into the sky. For instance, you have to consider where to launch from: launching isn't allowed around major airports, and you really shouldn't launch at all if you're unsure whether your payload will end up landing on a motorway, say, or crowded residential area.

The first day of the course therefore covered more science than I usually care to think about as we delved into the arcane world of the Pi In The Sky (PITS) board, where the PITS software logs telemetry for the LoRaWAN (long-range wide-area network) as well as other sensor data. We studied payload weights,



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> The view from space for our Pi unit:

burst altitudes, predicted flight paths, radio telemetry, RTTY, GPS and a fair few other members of the land of the TLA. Oh, and code. Lots of lovely Python code.

But don't be fooled into thinking this is only about science and tech. Just off the top of my head, some of the disciplines we looked at included physics, chemistry, meteorology, aerology, radio, electronics, aerodynamics, space exploration, geography, marine biology (the payload falls into the sea) and dendrology (payload stuck up a tree).

While that was taking place, we set about designing our payloads. I was part of Team Nimbus, which basically meant I was put in a group full of people with infinitely larger brains than I, so I settled down to choosing the colours for our gaffer tape and drinking straws, as well as choosing the bee (fear not, a fluffy toy one, not a real buzzing insect) we intended to place on the outside of the package.

Why drinking straws, you sensibly ask? Because these protect the payload antennas and help them to point straight down when the antenna module is attached to the base of the payload container.

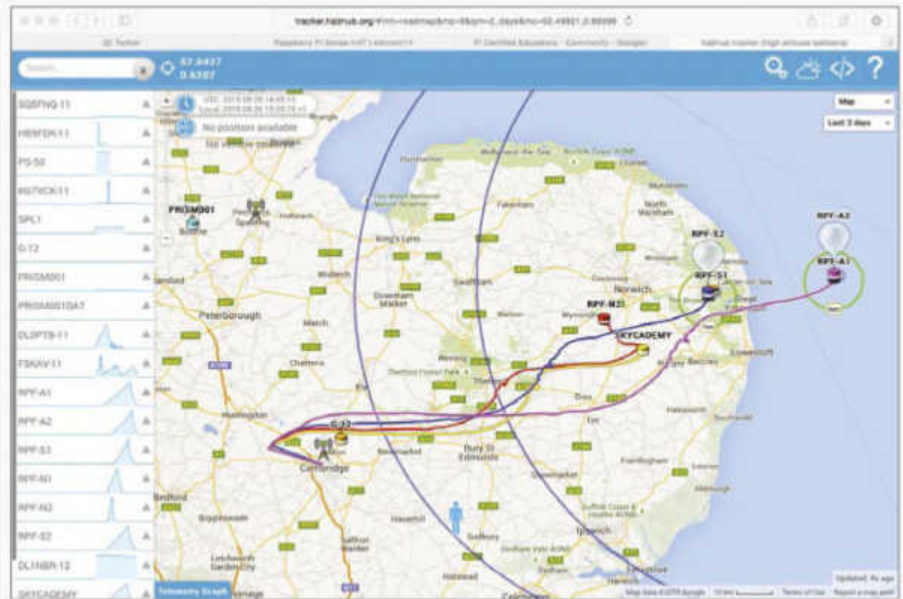
Then we come to testing. It's vital, for example, that your tracking equipment is able to detect the payload before you launch. You're then free to leap into the chase car and follow the flight path. So we tested. I'm not quite sure what the local residents made of the sight of grown men and women running around the streets outside Pi Towers waving polystyrene boxes in the air, as they checked if they could be detected by the ground station (at Pi Towers) and the car systems. Nobody got arrested, though, so it must have been okay.

The day drew to a close with heads spinning with newly gathered knowledge, as we all headed off for a group meal, and a chance to discuss what we had been doing all day with other team members. Tomorrow was launch day and the weather wasn't favourable, so we headed to bed in a state of trepidation.

LAUNCH DAY

The big day dawned and we headed off to our top-secret launch site at Elsworth, just west of Cambridge. Ground sheets were spread and the gas bottles handed out. Two teams chose hydrogen and three chose helium.

Some careful weighing now followed. Every gram makes a difference. Fortunately, there are a brilliant set of online tools that tell you all you need to know about how much gas is needed for a payload using a specific balloon that



you wish to burst at a specific altitude, or to ascend at a particular rate.

Predictions had already been run to work out where the payloads would land, again using the superb online software on habhub.org. Our biggest concern was the wind, which looked likely to make the payloads land in the North Sea. On the day, while it was breezy, the wind had abated enough for us to launch and expect our payloads to come down on the dry side of the Norfolk coast.

Balloons were inflated, the tracking software was tested again and then the first balloon was released (after a short pause to enable a Spitfire to reach Duxford unmolested – wimps). Some team members started to leg it to the chase cars, while the remainder made their way back to Pi Towers to monitor the dataflow and go “oooh” and “ahh” as each fantastic image made its way back to Earth.

One payload ended up in the sea, the rest were recovered. This was the first time so many balloons had been launched at the same time and it

✓ The payload. GPS on top, camera on facing side, antenna with straws beneath, ready to deploy



^ Live flight path and landing data for four of the flights from habhub.org

generated a great deal of excitement in the HAB community. The day ended with the payloads opened up and various space persons were extracted from inside. Our bee survived to tell the tale, as did Lego's Darth Vader and many others. It had been a phenomenal success.

The really brilliant thing about all this, though, is not the balloons, not the Raspberry Pi, not the add-on boards, not even the photos. It's the people. The people who made it possible. The people who took part. The Raspberry Pi community as a whole and the Raspberry Pi Foundation especially.

Astronaut Tim Peake, who was launched to the International Space Station in December 2015, took the Raspberry Pi higher than it's ever been, and the brilliant thing is that we'll all be able to share in the experience. it. Fly safe Tim, but above all, have fun! He'll be in space with a Raspberry Pi – how could he not have fun? If you're stuck on Earth like the rest of us, find a local Raspberry Jam and go there. Free your inner geek. You know you want to.

I would like to finish by thanking the Raspberry Pi Foundation for letting me anywhere near Pi Towers in the first place, and my school (Stoke College, Suffolk) in wholeheartedly embracing the Raspberry Pi. This enabled me to send five very excited pupils home last night with five of my Pis and the first five CamJam EduKit 3 Robotics Kits that had just arrived from PiHut. I didn't give them any instructions, just asked them to build me a robot. I can't wait to see what arrives. ●



DAVEY WINDER

"I CAN'T IMAGINE HOW TALKTALK COULD HAVE HANDLED THE POST-BREACH INTERVIEWS ANY WORSE"

Here are 15 expert tips to help you protect your data and avoid the schoolboy errors made by TalkTalk

If Jonghwa Kim, CEO of Vonvon – publisher of the Most Used Words Facebook app – played his own game, “privacy” may be large in the word cloud, but “transparency” and “clarity” would be missing.

Most Used was just another of those clickbait surveys, quizzes and “dumbotainment” apps that do the rounds on Facebook. They combine a similar level of pointlessness and fleeting entertainment value with a tendency to go viral, while logging your information. This last bit is the most important to me, but seemingly the least to those who participate. Does anyone read the privacy policies of the companies who provide these apps before agreeing to the string of access permissions they request?

For Most Used Words, which had close to 20 million players at the time of writing, that list of permissions includes: name, profile picture, age, sex, birthday, friends list, photos, education history, home town, current city, likes, IP address and timeline posts. I can't imagine why an app that generates a cloud of your most used words would need to access anything other than the first and last items – name and timeline posts – unless it wanted to mine your data and sell it off to create revenue.

Journalist Paul Bischoff made a similar accusation in a recent blog post, having read publisher Vonvon's privacy policy and not liked what he read. Like the app itself, his blog post went viral, partly through word of mouth, and partly because he offered tech journalists (including me) the opportunity to “use any images or content from this post, whilst referencing the original article”. Many did just that – without applying any additional research or judgement – and the resulting headlines soon prompted a response from Jonghwa Kim. He

explained why Vonvon wanted access to so much Facebook account data: “We use this information to deliver the most engaging and customised result. Don't worry. We use the information received from Facebook to generate your quiz results, and we never store it for other purposes. For example, in the case of the popular Word Cloud, the results image is generated in the user's web browser, and the information gathered from the user's timeline to create personalised results are not even sent to our servers.”

However, Vonvon went on to say: “In the past, we have been asking our users for a comprehensive list of access privileges so that they can enjoy our vast library of quizzes and games as smoothly as possible without any service interruption. However, we do realise that some of our users are concerned about their privacy protection. To accommodate these concerns proactively, we have significantly reduced the magnitude of access privileges for What Words Are Most Used content as of 24 November 2015. You'll now be asked for your public profile, friend list, and timeline posts.” That's still too much for my liking, but then I do veer towards paranoia when it comes to third parties wanting access to my data. Vonvon's insistence that it doesn't “store the raw/hashed/compressed/processed words gathered to create the ‘word cloud’ image at all”, nor collect my email address, doesn't impress me.

I'd be less bothered if this app did something more useful than showing what words I've used most often on Facebook. I mean, who cares? I allow my Android keyboard replacement app to see such data because the risk in so doing is balanced by the useful predictive text capability it enables: without that, I'd grant it no access at all. It's not rocket science, but it appears beyond the ken of millions of Facebook users, just as writing a coherent, transparent and legal privacy policy seems beyond many app developers and businesspeople.

That the app performs all of its parsing of timeline data and word cloud

generation in your browser, rather than an external server, is reassuring, but that Vonvon hadn't thought to tell us is, at best, naive. The CEO stated that “non-personally identifying information is not the same as personal information” and that Vonvon isn't the only company that uses “analytics tools to better understand our users with cumulative behavioural data”. That's true, and provides a clue to the revenue model being used. It's about display advertising – the app displays an advert when first loaded and that's where Vonvon makes its money. This is the sort of thing that should be in your privacy policy if you want to allay fears about data collection and usage, especially if you're in the kind of business that asks users to grant data accesses beyond what appears to be strictly necessary.

I don't usually defend the creators of this kind of Facebook quiz app – I hate that they clutter up my timeline – but I do think that Vonvon has been too harshly judged this time. In a revealing interview with the LA Times, the company's president of North American operations, David Hahn, said: “In many cases, these privacy policies are recycled from benchmarking your competitors and major players in the industry”, which could explain a lot. If you're going to use a template for your privacy policy – which for all but the largest enterprises, with money to throw at lawyers, is often the only practical option – then at least customise it to reflect the needs of your business and the brains of your customers. Vonvon CEO Kim sent out a statement to journalists saying that he used to have a clause about sharing information with “trusted business partners”, but this was removed after a similar privacy debate in the Japanese media some months ago. It was replaced by one stating that personal information is only shared when required by law.

This at least shows that the company monitors and responds to criticism, which is a good thing. The business partner clause was put in “without much thought since most media sites have similar policies”, according to Kim, who



DAVEY WINDER

Davey is an award-winning journalist and consultant specialising in privacy and security issues. [@happygeek](#)

also stated “we are a small team coping with surge of traffic from worldwide [sic] and we didn’t have [the] luxury to play around [with] legal documents to make elaborate loop holes”, before admitting “our privacy policy may not be the world’s best and I’m not proud of the state of sophistication”.

It seems as if Kim and Vonvon are learning from their mistakes, and you should make their sorry saga an opportunity to look at your own privacy policy and revise it where necessary. In this post-Snowden world, more and more people are taking an interest in the wording of such things, and you may not have a pointless quiz to divert their attention.

PLAYING THE GAME

If you’re a Call of Duty fan (or any other multiplayer shooter), then you’ll recognise capture the flag (CTF) as a type of game where teams compete to do precisely that. So how is this relevant to IT security? Well, many security researchers I know are obsessive gamers, and a CTF competition has formed part of the annual Defcon hacking conference ever since Defcon 4 in 1996. Defcon talks about running custom services and pwn’ing the game servers of the opposition, while patching and protecting your own, as being at the heart of CTF, and testing computer and network security is what it’s all about. Competitors will be looking for poorly configured crypto, availability of SQL injection or cross-site scripting attacks, buffer overflows and heap exploits.

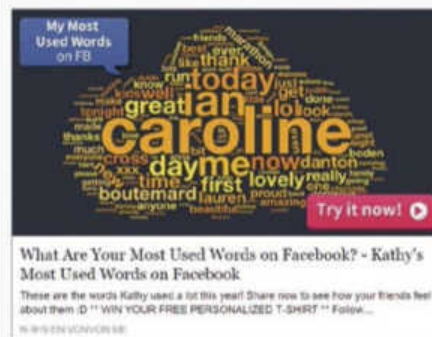
If those things sound familiar, that’s because they’re exactly the vulnerabilities that hackers look to exploit when attempting to breach your real-world network. So, yes, CTF can be fun, but it can also be a great training and educational tool for security teams.

A typical CTF objective would fall either into the attack or defence camp (assigned machines on isolated networks to be defended or attacked, with the attack involving planting your “flag” in the form of a specific code string or executable onto the target device), or the jeopardy camp (solving a series of security-related problems). If you’re still thinking of CTF in terms of game-playing nerds, then replace “game” with “real-world security simulation” and the relevance becomes more apparent. Whether your team is defending or attacking a system, the process will naturally improve your skills.

Naturally, this is sandboxed, so no damage can be done to live systems or data, but the experience can be applied to your production environments to make

them safer. Think of them as military war games, or a fire drill. The CTF games tend to be dominated by larger enterprises who have incident-response teams to send along, or by security vendors whose researchers are released into the wild for some R&R with a dash of learning. However, that doesn’t mean that playing simulated attack games is something smaller businesses can’t or shouldn’t be involved in.

PhishMe (phishme.com) has built an excellent reputation for training staff in awareness of social-engineering attacks using these simulators. It runs as a software-as-a-service package that periodically sends targeted employees a simulated phishing email. This is designed to test how they’ll react to real-world phishing attempts, with the most susceptible given further training. This kind of gamification of security threats is really effective and works best outside of the well-informed world of security professionals. The idea can also work



▲ Most Used Words collects a host of data, including age, sex, photos, friends and IP address

well for smaller businesses that don’t have a dedicated CISO, but still need to keep on top of security issues.

A product such as Cyber Defender (cyber-defender.net) from Fortinet helps both to engage the player with the kind of problems they face, and to inform them of the available options. Sure, it’s a vendor-based sales tool, but it’s free and is better than a rote memory approach to getting secure thinking into your business. You play the role of chief security officer of a large global enterprise (although the same security mindset also applies to smaller businesses) who is given a mission to protect corporate assets and client data with a small budget. Sound familiar? The game starts by letting you spend your security budget, but your decisions will affect how you react to the fast and furious attacks that hit you as the simulation progresses. If the damage cost to the company gets too high, you’re fired and the game is over. You’re given a year (game time!) to demonstrate that your security strategy is the right one.

What I liked was that the game shows how small security investments, if chosen wisely, can prevent wide-scale damage to your business. Have a go and see how your security smarts stack up.

OPSEC FOR YOUR BUSINESS?

OPSEC is the trendy acronym for “operational security”, defined as protecting data that could be used against your organisation. That’s just as important for small businesses as large enterprises, governments and even terrorists. In fact, terrorists understand better than most how vital OPSEC is to their ability to wreak havoc. However, OPSEC, despite its military roots, isn’t only about protecting the kind of classified or sensitive data you might expect your attackers to be after: it’s about all of your data, especially the information you might not expect could be used against you.

At the heart of any OPSEC process is the ability to see your organisation and its security measures through the eyes of those who would do you harm – from individual threat actors right up to state-sponsored spooks. At one end of the scale are the CTF games I was just talking about, while at the other end could be the deployment of highly encrypted communication channels and Blackphones. I’m not surprised that ISIS understands IT security and OPSEC, but I’m relieved that its followers don’t always do the right things. An ISIS OPSEC manual has recently come to light, which is a copy of a handbook originally intended for journalists and activists in Gaza to protect their identities and keep them safe. But the perpetrators of the Paris attacks in November failed to follow it to the letter: the discovery of an abandoned and unencrypted smartphone outside the Bataclan theatre led security services directly to a safe house in St Denis, where a shootout later ensued.

The translated version of that OPSEC manual may not seem like an obvious choice for your business security, but the beauty of OPSEC lies in its flexibility, in adapting it to the needs of your organisation. That doesn’t mean I’m recommending it as a “cybersecurity by numbers” tutorial, but adapt OPSEC advice and it becomes relevant and practical. Y

You probably won’t need end-to-end encrypted instant messaging using an app such as Telegram, but you should know which data is sensitive enough to require encryption and which isn’t. You should also understand that whatever you broadcast (via social media, for example) could be useful intelligence for an attacker. ●



STEVE CASSIDY

"AS WE ENTER 2016, SOME OF THE ARCHITECTURES ON THE LEADING EDGE OF THE CLOUD BUSINESS AREN'T THAT NEW"

The spotlight may fall on the fast-moving, innovative areas of technology, but "slow IT" is still of vital importance

There were a number of seismic shifts in the IT business in 2015, though most of them felt remote to everyday PC buyers – until they went out into the market and tried to purchase something. The kinds of "something" I have in mind are the absolute opposites of our own PC & Tech Authority recommendations: they're definitely "not A-List". Understand that I'm not denigrating our A-List, whose place and purpose is to highlight the winners in an ever-shifting war of technological innovations. The minute Samsung outflanks Apple, we'll be updating our league table and shifting our advice, and one has only to go to our annual awards dinner to see how important this is for the guys in the front line of selling, delivering and developing new stuff. But a crevasse separates A-List products from the priorities of the folk who have to sit down and plan investment in computing.

If you believe that there's no longer any separation between a business and its IT, it naturally follows that purchasing decisions with very short horizons, based on leading-edge technologies, can't guarantee that they'll remain useful and relevant throughout the anticipated life of a project.

You can end up with a project that depends on consumer-orientated hardware and software standards, then discover halfway through that these aren't compatible with the hottest, newest tablets. They take up too much memory to run on the older tablets once all the OS upgrades and patches have been applied. The A-List sits above these kinds of pressures, and spending too

much time gee-whizzing over leading-edge gadgets can pass over many of the priorities of the bigger IT buyers.

These are the sort of guys who know it takes more than a year to roll out new laptops to everyone, and who, therefore, think it not unreasonable to have exactly the same machines available to buy on 31 December as they were ordering on 1 January. On this subject, it might amaze you to hear that, at the end of November, Microsoft announced it would no longer be selling docking stations for its Surface Pro 3. That's a shocker. I realise it's intended to boost interest in, and sales of, Surface Pro 4, but it's still a weird decision given that almost every Surface Pro user I know bought a matching dock (and at least one of them hangs several screens off it).

It seems that Fujitsu agrees with me because the firm's proposal – at a Fujitsu Forum in Munich – was that "human-centric computing" is the way forward. As you might imagine, I was preparing to kick this bland nostrum to pieces, by playing the usual game of "so what would inhuman-centric computing look like", then comparing opposites to see which questions pop up. But before I could pounce, I ran into Dr Joseph Reger. His presentation involved no PowerPoint: he just wandered around the room, answering questions that audience members had a few seconds to think up. That's a fairly tall order even for journalists, since this was at the very start of the event before we'd all wandered around and picked up the themes and presentations. I'll confess that I couldn't follow every riff he came out with, but one stood right out for me, namely the idea of "fast and slow IT".

SLOW IT

The world of clouds and tablets may be very fast-moving and agile, but it's not particularly high-performance, nor especially cheap, nor well suited to an

effectively infinite archival preservation of data. That's "fast IT". Its opposite, "slow IT", has been suffering hard times recently, as the spotlight has swung away from it. Slow IT is all that stuff we've been working on for the past three-plus decades, the stuff that's organically grown within the enterprises that Fujitsu specialises in serving. What slow IT lacks is all those hot buzzwords that we've all been trading for several years now – "responsive computing", "on-demand", "elastic resourcing", an entire pack of buzzword-bingo cards. Slow IT is a safe repository containing a faithfully and carefully debugged back catalogue of systems, services and databases that have been banging away inside these big businesses for decades.

Not that there's much wrong with this stuff. Go to any car-hire desk and you'll find worn-smooth keyboards, operated at lightning speed by bored clerks whose cheeseparings bosses elected not to tread the path of the hotel business by investing in GUI systems. Wait in line in any hotel and their clerks will be

▼ Tatsuya Tanaka's keynote in Munich speech typified slow IT



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merrily clicking away on a database whose layout has almost nothing to do with the smooth processing of guests, but everything to do with looking complicated to justify its cost. Slow IT has been responsible for some terrible howlers, but as Dr Reger pointed out, the howlers are overshadowed by strengths such as longevity, durability, reproducibility and standardisation. Buzzwords from an earlier generation, but still vitally important.

This is Fujitsu's home turf – demands from big institutions and enterprises who intend to remain digital in an old-fashioned way, as that's how the public expects them to behave. You could be forgiven for thinking it's just sour grapes because there's no Apple/Fujitsu tie-up, and no A-List entry for any hot Fujitsu phone. Yes, okay, all this fast IT needs to be taken into consideration. But just look at the wider picture, a picture I got from a long list of senior Fujitsu managers from the UK and Ireland. Fujitsu is, after all, still very much a mainframe computer business.

I was reminded of this by Tatsuya Tanaka – the top man at Fujitsu – at his keynote speech. From a German-tinged, PC-geeks-grown-up sort of meeting, we were plunged into the world of the very large Japanese corporation. I had to shout and stamp my feet to get a seat at Mr Tanaka's keynote, because company execs ate into the press seating allocation that usually covers the first couple of rows: such execs are higher priority than the PR agencies who invite the likes of me. Having raised a commotion at the door, I snaffled one of the last seats just in time.

Tanaka's speech typified slow IT, displaying a grander view of the nature of business, as seen from the peak of a large, 80-year-old organisation that started its life providing telephones for Japanese homes and offices. Quite a lot of the references were clearly for the benefit of his employees, and many of those employees were the low-level kind that we tend to forget are still needed to put together the systems we use. Tanaka was gracious and careful in his references to workers' councils, as well as to the victories of the Japanese team in the Rugby World Cup, of which Fujitsu was a major sponsor.

I was reminded of a visit I made last year to Cray's new offices down in Bristol. Cray is another company that has a very different outlook to those possessed



▲ Microsoft has announced that it will no longer be selling docking stations for the Surface Pro 3

by pre-tablet, pre-PC era IT brands: it expects to become deeply engaged by an enterprise in ways that Amazon and the other cloud vendors can only dream about. Fujitsu certainly thinks in exactly the same way.

You could be forgiven for believing that cloud computing is predicated on virtualisation, which in turn requires the presence of an x86-architecture CPU somewhere. However, I feel

“Having raised a commotion at the door, I snaffled one of the last seats just in time”

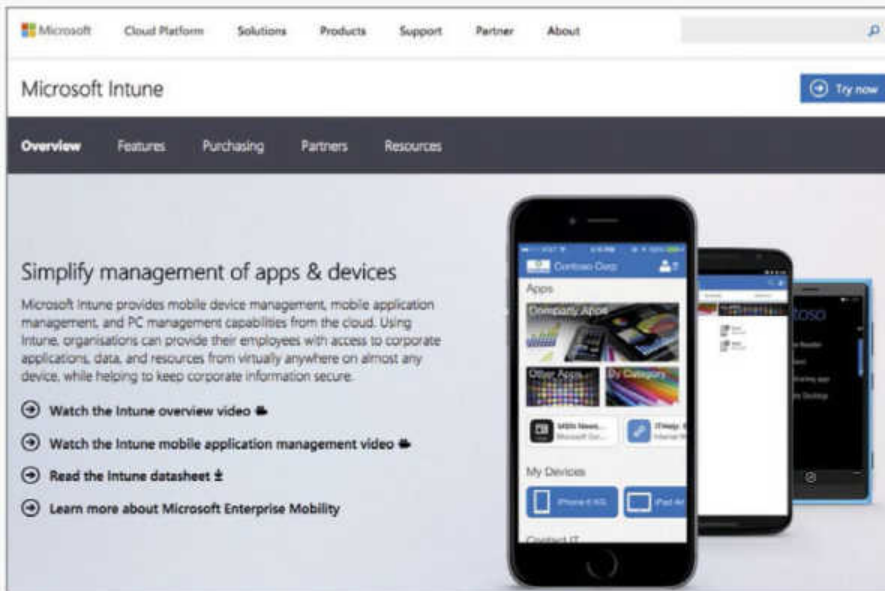
obliged to remind you that some of the architectures on the leading edge of the cloud business as we enter 2016 aren't that new, and, in fact, have come full circle. Container-based virtualisation is one example, as well as the appetite for VMs that are profiled, shaved and honed to make them good at running Java code very quickly and efficiently. These are both survivals from the old-school mainframe world, which can still show the piecemeal, made-from-bits PC mindset a thing or two about running hard and fast.

That may explain why Fujitsu has been talking about a thing called MetaArc. This is its large, and thus far quite private, take on cloud extensibility for the customers they already have, who have been blurring the distinction between big-iron, on-premise, old-school compute capacity and off-premise extensible cloud for decades. I expressed my surprise to a senior chap that Fujitsu

had sufficient connection capacity to be playing in this kind of market, given that I'd just been hearing from relative upstart Equinix about its decision to lay its own transatlantic fibre between its data centres. He immediately said: “Oh yes we have some of those ourselves. Started as a telecommunications company, you see.”

Wait a second. This business, which has built its reputation – certainly within PC & Tech Authority – for its servers, PCs and laptops, has been laying its own undersea cables to support its largely private/hybrid cloud deployment projects! Had one of the “usual suspects” such as HP, Dell, Lenovo or Supermicro been doing this, it would be front-page news. There has been a chasm of mutual incomprehensibility between the world of hardware-making, software-cutting classical IT and telecommunications for the entirety of my career, and those of my ancestors active in these fields (a timespan, incidentally, that's ten years longer than the 80 years of Fujitsu's existence). In the US it's been taken as read that there's no need for an AT&T to get into making computers because there's no actual requirement for the mindset and instincts that drive the telecoms sector to meld in any way with those of the IT biz. Until now, that is.

There's a trend toward deploying hybrid IT, for stretching the cloud to make it do 2016-style things such as collaborating in ever-shifting patterns with ad hoc teams of project participants. Meanwhile, you employ devices squirrelled away inside your own network to keep local copies of all the passing instant messages and synced/shared company documents.



^ Most people believe that you have to run to Microsoft Intune to control and manage a kit list of diverse parts

Suddenly, Dr Reger's slow and fast IT, and the worlds of telecommunications and information identified by Tanaka, need to be brought together. Looking around the company IT marketplace, the best way to fulfil a big ask like that appears to be to do it all yourself. Find a software platform that can handle truly cross-cloud data collation, then run analytics and deep searches on the resulting data lake once you have it close to hand (so nobody can deduce what you're doing with it by looking at your cloud resources billing data). Remember also to buy a big rack of machines and some disks to store it all. Alternatively, you could go to a company that looks like it might have the breadth of understanding to take on that kind of job for you.

I realised something that might have rendered some of my questions to Fujitsu's people slightly sharper than necessary, namely who did they think their competitors were? If you were faced with the buying decision I proposed at the start of this column, there are a lot of firms that you might have a conversation with, while also working out your process of filtering and selection. For decades, the world has thought of HP as the go-to for corporate server-room hardware, to take one example that has been good for all concerned (at least until HP started to squeeze its long-term, slow IT userbase with restrictive and eventually financially painful extended warranties). Dell talks up its worldwide service network to support its desktop PCs, laptops (and now its fancy 2-in-1 hybrids, otherwise known as tablets with keyboards), but most people believe that, to actually

control and manage a kit list made up of such diverse parts, you need to drop the phone by the gear and hot-foot it over to Microsoft to sign up for Intune and/or System Center. (Dell actually has an equivalent to Intune, and heavily overlaps with System Center with its management software stack, quite a lot of which actually predates it.)

"I think Fujitsu is rather bemused by this maelstrom of competition in the sector"

I think Fujitsu is rather bemused by this maelstrom of competition in the sector we've been living in. Pretty much every answer its people gave was some paraphrase of "oh yes, I think someone in another country runs that business unit, so I don't know about it in detail, but we do it". Even so, I got the very strong impression that it would only take a very tiny slip by one of the more familiar brands, one that was getting tired of battling the barrage of buzzwords from the fast IT types while facing ever more strident demands for better and better slow IT, for Fujitsu to find itself at a very considerable advantage. An 80-year-old business, after all, has that much more of a story to tell.

DON'T FORGET THE HUMBLE HBA

I was pretty pleased with myself in the speed stakes this month. I was still basking in the glory of having not only a fast, 1Gbit/sec internet connection but also a fast, low latency (sub-1ms) and a

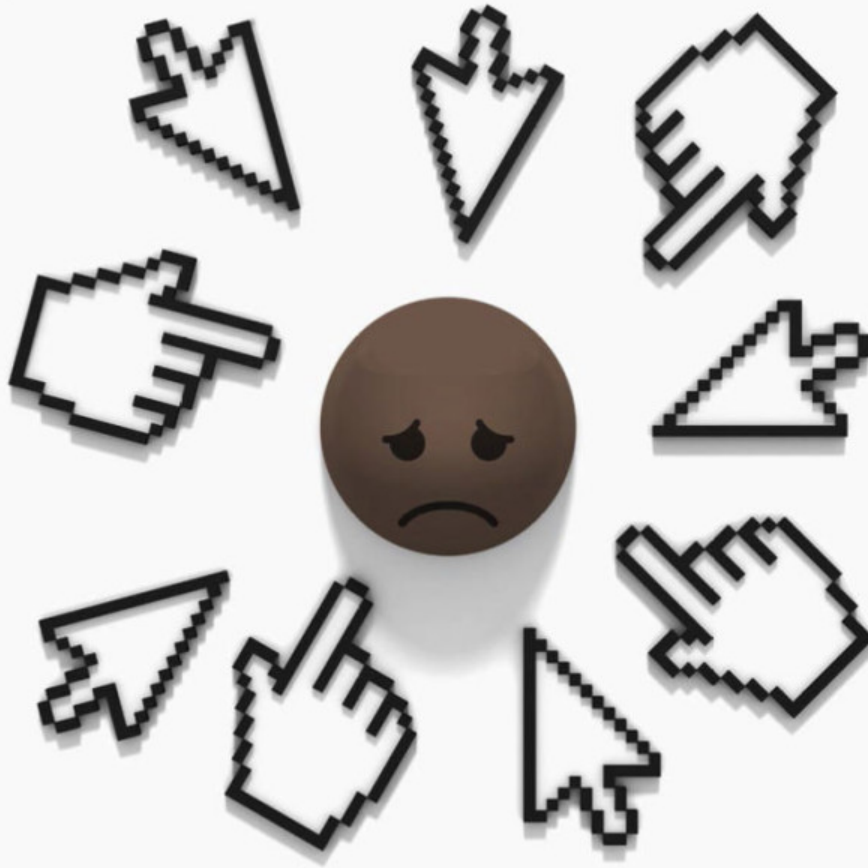
short hop count – about four or five, from the national backbone. I also managed a sustained record for data access over my own LAN of 140MB/sec, between my ancient HP server and a NAS box. The secret sauce here lies in putting more than one LAN card into the server, and segregating my storage traffic from my user-access traffic across the cards.

None of this prepared me for the speed-busting capabilities of my client's setup: when copying a sizeable VM disk image over to the same brand and model of NAS, he added an easy 100MB/sec to my record by getting 250MB/sec. This stimulated much envy. I'd put my own LAN together, and even though his server was a lot bigger than mine, I couldn't understand where that huge hike was coming from for quite some time. Until, that is, I realised that Server 2012 R2 had identified one of his motherboard Ethernet interfaces as being capable of dedicated use as a hardware-based iSCSI controller.

If you've been fiddling with iSCSI, you may have seen the many references to the Microsoft iSCSI virtual adapter – a software stack that handles the decoding and bit-shovelling required to take a piece of storage-only LAN traffic and turn it into something the disk subsystem can do something with. This is a very dull job, in many ways not worthy of the attention of the main CPU in the server. For years, it's been the preference of bigger storage designers to handle this dull job at very low level by add-on cards, which treat the Ethernet they're connected to as a private fiefdom, not to be trespassed upon by other types of traffic. These are host bus adapters (HBAs), and it appears they still have something to offer in an era ripe with slogans such as "software ate the world" and ideas such as software-defined networking.

Of design concepts and options that encourage you to think you only need the cheapest kit on the market, no more need be said. This little test we unintentionally ran put numbers behind the escalation from a first-try, single-Ethernet server with the iSCSI initiator on it (about 25MB/sec), to a dedicated Ethernet port on an untuned and unconfigured Gigabit switch (about 45MB/sec), then onwards to a setup with all the right tweaks such as jumbo frames, flow control and a good Ethernet chipset and driver (that's my own 140MB/sec config).

But for that final, very worthwhile, boost you need to give up all that software-defined stuff and go for the dedicated HBA chips, which are worth another 100MB/sec on top. ●



CYBERBULLYING OF AUSTRALIAN PUBLIC SERVANTS CAUSES ALARM

Over 400 report incidents in past six months

Cyberbullying of Australian public servants has been put firmly back in the national spotlight after university research revealed at least 430 alleged incidents in the past six months alone. The research, by QUT's Dr Felicity Lawrence, consisted of three studies "involving more than 600 public sector participants from across Australia". Of those participants, it found 72 percent of public servants "reported experiencing or observing task- and person-related cyberbullying over the past six months."

About the same number reported their workplaces as "highly stressful", according to the research. "Crucially, nearly half of participants reported a negative impact on their work performance and productivity," Dr Lawrence said.

Dr Lawrence said public servants sometimes make decisions that can adversely impact other staff or clients, and as a result "may receive aggressive and bullying emails, YouTube videos or social media posts from the affected

staff or clients." "Government employees view this online behaviour as more intense than face-to-face bullying as cyberbullying crosses work and home boundaries and can follow them from job to job, state to state, and is difficult to stop or remove from the internet," she said. "[In addition], the public servants I surveyed indicated that there's a kind of 'cyber-underground' that has created a hidden negative online workplace culture where some employees feel they are free to harass and bully one another and yet remain unaccountable for their behaviour."

Dr Lawrence said even one bullying or defamatory post could cause lasting damage for its victim, partly because of the difficulty of removing it from the internet. She urged the Government to develop "federal anti-cyberbullying legislation covering all Australian workplaces".

Prior to QUT's numbers, the last published guidance on cyber-bullying instances came from the 2012-13 State

"A kind of 'cyber-underground' has created a hidden negative online workplace culture where some employees feel they are free to harass and bully one another and yet remain unaccountable for their behaviour."

of the Service report – the Federal Government's yearly snapshot of public service statistics. The report relies in part on numbers drawn from an annual census of federal public service employees. The census drew 102,219 responses that year, and the report identified 2 percent had been cyberbullied, which would equate to around 2044 employees. "While the incidence of cyberbullying is currently low relative to other forms of bullying and harassment (two percent) of employee census respondents reported experiencing this behaviour in 2013), the impacts it causes are no less severe," the APSC said at the time. "The impact of increased social media use on incidence of cyberbullying is yet unknown and the Commission is working with agencies to develop guidance to support agencies and employees in dealing with this behaviour." That advice was released later in 2013. A breakout of cyberbullying numbers was not provided in subsequent editions of State of the Service.

In an editorial accompanying reporting on the latest QUT numbers, Fairfax opined that laws by themselves were unlikely to "halt or even ameliorate the evil of cyberbullying", instead saying that much of the answer lay in addressing it at a social or cultural level. However, it lauded the research and said that "the start of the year is an appropriate time to call on the government to take a genuine leadership role on this problem, and to warn it of the ramifications of the failure to act."

"We believe the nation's valued public servants deserve a better deal and accordingly, call for a national conversation to discuss the most appropriate mix of legislation and education, in the search for the best strategy," Fairfax added.

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THE SIMPLE REALITY IS THAT MP3 IS AWFUL - LIKE PUTTING A SONG IN A FOOD BLENDER, SAYS JON HONEYBALL

“ I shouldn't have got involved. It was in my local pub, a few sherbets consumed, and the discussion was, shall we say, lively. The news that Tesco will start restocking vinyl LPs made us reminisce about Dansette record players, that wonderfully nostalgic “music centre” of the 1970s and 80s. Then came the bit where I should have kept my mouth shut: that CD was so much better because it didn't have pops and crackles, and was, of course, digital.

Instead, I waded in, pontificating grandiosely how analogue vinyl turntables could sound really extraordinarily good, but they required care, attention and the choice of a good vendor. You don't have to spend ten grand on a full-spec Linn Sondek LP12 from the maestros at Linn Products – a few hundred dollars to the fine artisans at Rega would do for most people.

No, digits were apparently better. I was told there was absolutely nothing wrong with the MP3 format. The look on my face, akin to my sucking on a lemon, caused a hoot of laughter, and accusations of being a “golden ear”. Well, I have spent 30 or more years listening, testing, reviewing and occasionally designing high-quality hi-fi equipment. The simple reality is that MP3 is awful. Execrably awful. Like putting a song through a food blender, then adding a good spoonful of ready-mix concrete, with some shingle for good measure.

The problem is that the ear is fantastically non-linear and we have almost no means to accurately describe how it works, other than relatively simplistic terms. Worse still, it's hooked

up to a supercomputer in the brain, and we really have no idea what that is doing.

Almost every public preconception about how the aural system works is wrong. Yes, we can hear higher than 20kHz, but not necessarily in steady-state tone frequency terms. We can hear fantastically small amounts of jitter on a digital signal, measured in mere picoseconds. All sorts of things can be heard in the right circumstances and controls. You can distinguish a 0.1Hz pitch difference at 1KHz; you can hear 0.2dB level differences. However, the body of “knowledge” out there maintains that this is hokum. The problem is that much, maybe even most, of the real knowledge about what can and can't be heard, reliably in the right conditions in IEC-specified listening rooms, is tied up as proprietary intellectual property and not available to the public. It's simply too valuable to set free, because doing this stuff properly costs money.

Want to compare MP3 to other codecs? The best way to do this is with the Sonnox Fraunhofer Pro-Codec, which lets you do blind ABX comparisons and technical evaluation of what is going on. Sounds like a good idea? It is, but the software costs hundreds of pounds.

There is real value in delivering high-definition audio to the part of the public who cares about these things, and who don't want everything reduced to an MP3 mush. So you won't be surprised to learn that, some 18 months ago, I bought the new Pono high-definition music player. Plug a decent pair of headphones into the Pono, play high-quality material that hasn't been scraped off the floor of a record company's warehouse, and watch listeners' faces light up as they hear



“There is real value in delivering high-quality audio to the part of the public who cares about these things”

things they have never experienced in their music before.

Pono is the brainchild of Neil Young. While I have no question about his abilities as a singer and songwriter – at least one of his songs would be in my Desert Island Discs collection – I do have concerns about his ability to run a business, especially one in the dog-eat-dog music industry.

It's hard enough not to be ridiculed at the pub, but when you play your friends material and they say “wow”, it's useful to have more than a few tracks to offer them. Pono is turning from being a help to a hindrance. If Neil wishes to remain on my Desert Island Discs list, my message is loud, hiss-free and clear: he needs to change the record.



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